The Builder.

VOL. XVIII.—No. 891.

Incentives to Study in London.

TIME was, when our country cousins, reaching London by tedious stages of some days' duration, considered themselves recompensed for their fatigue by a sight of the lions and other wild beasts then kept in the Tower. Seventy years ago there was not a very marked improvement in the class of entertainment provided for their edification. Sir Joshua Reynolds was president of the infant Royal Academy; the British Museum was located in a nobleman's deserted house, and so little visited that, as the books show, in a whole month there were sometimes but five readers in the library; Miss Burney, penning her sketches of London life, as seen from that central rendezvous of wits, her father's house, in St. Martin's-lane, makes her country-bred heroine, Evelina, visit Ranelagh, as the most absorbing of metropolitan attractions. But in these days our country cousins are better provided for. They may now speed up to town, stageless, with steam steeds, and find intellectual feasts of the highest order spread for them in every direction. On all sides they may see around them incentives to greatness, which can scarcely fail to produce an effect upon every mind, however unimpressionable. Evelina could now visit educational collections from which she might return, if she had eyes to see with, and ears to hear with, a beautiful blue-stocking. At two extreme points of the metropolis two magnificent establishments have arisen within the last half-dozen years, vying with each other in the vitality of their efforts at industrial and art teaching—the Crystal Palace and the "South Kensington" Museum, both marvels our ancestors would have been accounted mad or dreaming to mention. Within little more than the same space of time, Montagu House has been razed to the ground, and the present noble and substantial Museum built on its site; the National Gallery has been removed from Pall-mall to Trafalgar-square; the Geological Museum built; and similar improvements made to public property of an educational description in numerous other instances. The new reading-room at the British Museum contains twenty-five miles of book-shelves and upwards of half a million books, whose number annually increases to an extent of 20,000.

No eye can look with apathy upon the priceless literary treasures carefully preserved in this library. In one case is a half-finished sonnet to a lady, written in Italian, by Michelangelo, on the reverse of a rough chalk sketch of a man's face and leg; in another, an order from Peter the Great to his shipbuilder in St. Petersburg, to put the ship, *La Ferme*, in the same order and repair as that in which it arrived from England. sIn another case, among the avenues of table and screens spread out with missals and autographs of the first interest, is a letter from Lady Jane Grey, calling on the Marquis of Northampton for his assistance in the defence of her title against the "fayned and untrewe clayme of the Lady Marye, bastard daughter to our great uncle Henry th' eight, of famous memorye," signed, "Jane the Quene." And not far from this is the small manual of prayers, margined with her handwriting, the poor lady used on the scaffold. King George II. gave to the Museum all the old royal libraries accumulated from the time of Henry VII. Among these regal relics is a duodecimo volume, whose silken cover is embroidered with silver, in the handwriting of Queen Elizabeth, when princess. It consists of a translation of English prayers or meditations, composed by Queen Katharine Parr, into Latin, French, and Italian, with a dedication to the king, her father, to whom it was presented. There is also a crimson book, with gold clasps and corner pieces, entirely written by King James I. for the instruction of his son, Prince Henry; and a quarto volume in the handwriting of Charles I., when prince, consisting of a selection of passages from the Latin poets, presented to his royal father, to show his progress in his studies. This old regal treasure is rife with glimpses of court occupation 300 years ago. In a book of Hours, preserving the autograph of Henry VII. and his Queen Elizabeth, Henry VIII. and Queen Catharine of Aragon, is contained a prayer translated from the Latin by the Princess Mary, when only eleven years of age. With these tangible bits of history before his eyes, who would not be an historian? Nor can the enthusiam of the visitor be unmoved when he finds himself before the original Book of Indentures made between Henry VII. and John Islippe, Abbot of Westminster, for the foundation of the King's Chambry in the Abbey, enhanced in interest as it is with the enamelling on its crimson velvet cover; or before the famous Durham Book, cast out of the *Season*, after shipwreck, uninjured, "through the miraculous agency of St. Cuthbert;" or before the Psalter of the Nuns of St. Clare, whose slender figures wrought the intricate needlework on the cover; or before the Psalter of Melisenda, wife of the Comte D'Anjou, king of Jerusalem, in a cover of carved ivory, set with torquoises. All these things address themselves to the students of the past, as do the contents of the Roman, Anglo-Roman, Græco-Roman, Lycian, and Assyrian galleries under the same roof. View the veritable fragments from ancient Greece, caryatides, columns, friezes, architraves, cornices, and coffers! Think of the sun-baked bas-reliefs from the overthrown cities of Assyria, representing bull hunts, lion hunts, sieges—showing architectural effects—serrated parapets and arched gateways, capitulations, the triumphal returns from battles,—kings, soldiers, priests, musicians, horses, and grooms; bronze bowls, ornaments, weapons, vases, ivory carvings, fragments of beautifully coloured glass, and, more curious still, the two odd eyes intended for statues, one of which has an iris as deeply blue as an Assyrian pool. Then contemplate the sand-hidden remains of Egyptian magnificence, the sculptures, the obelisks, sarcophagi, and paintings; the ebony chairs inlaid with ivory, the lamps, the bronze mirrors, the vessels in alabaster, serpentine, glazed steatite, porcelain, glass, and terra cotta; the tools, musical instruments, and writing implements, till you can trace the manners and customs of an ancient Egyptian to the dread day when he was made a bugle-decked mummy.

The South Kensington collections may be more especially considered Young England's Museum. There are arranged educational apparatus of every description, from the approved forms on which scholars should sit, to the well-chosen books and maps from which they should learn; so that any country clergyman coming to town for, perhaps, a rare holiday, may take home to his village school information he could scarcely have hoped otherwise to acquire. This boon is so new, that we are not able to estimate the incalculable effect it is certain to produce upon the educational developments of the rising generation. The horn-book, already a thing "not generally known" (*vide* Mr. Timbs), will, by its influence, be looked back upon as a leaf from the Middle Ages. The scheme of this section of the collection is assisted by the others; in the first degree, perhaps, by the illustrations of food and animal productions. Under this head we can see creation, almost, at a glance; the cereals and fruits of every clime, every thing that can be either eaten or worn, furs, feathers, woollens, silk in every form, in cocoons, wound, dyed, and woven; in fine, everything the ingenuity and enterprise of man could collect is here displayed. These, however, and the architectural illustrations and materials have been too often mentioned in these pages to require now more than enumeration, to show the immense educational advantages the Future will enjoy over the Past. There is scarcely an object of note on the Continent that cannot be seen now nearly as well in London, either by facsimile, model, or photograph. The decorations of Raffaelle's Loggia in the Vatican are faithfully represented in the Kensington Museum. Casts of the finest statues in Rome are there, too; bits of mosaic, cameos,—in short, the particular individuality of Rome is now within a fourpenny ride of the Bank. No passports required; no sea voyage. Open free of charge on Mondays, Tuesdays, and Saturdays! And then the glorious old furniture! What art-workman, countryman or Londoner, could view the rich carvings of the cabinets, the jewelling of the reliquaries, the paintings on porcelain, the enamelling, engraving, or other art-work, unmoved by a determination to go and do likewise? Let him but spend a couple of hours under the influence of the feelings conjured up by these master-pieces, and he must be conscious of an inward and ennobled change in his sympathies and aspirations.

Of the Geological Museum we have already spoken at some length in a former number: on its usefulness as an incentive and assistance to the attainment of scientific greatness, we need not again enlarge; but will remark, instead, upon the great pleasure and varied information just now afforded there by the lectures of Professor Owen. Sculptors would do well to hear these, for the professor boldly points out conventional errors in the anatomical details of their zoological subjects.

Passing on to Sydenham, we see Streatham in the distance, famous as being the residence of the Thrales and their distinguished guest, Dr. Johnson. Here came Miss Burney, flushed and encouraged with the success of "Evelina," which Johnson praised, and Reynolds and Burke sat up all night to read; by the side of which the popularity of "Jane Eyre" pales, and that of "Adam Bede" appears clouded. It is worth while to read afresh a book that the fashionable world feasted on with so much relish, to note, as a phase of our subject, the great improvement that has taken place in the quality of the intellectual food provided for the public.

The contents of the Palace are all that its magic-suggestive name promises. For picturesque effects we have fountains and fishpools, flowers and plants; for art-teaching purposes we have statues and paintings, with nooks of Spain, Pompeii, Nineveh, and Egypt; for examples of industrial arts, manufactures from all the civilized nations. In this building we can again take art from its cradle in Assyria or Egypt, and trace, after its long sojourn on the banks of the Nile, its progress through Greece and Rome, and during the Middle Ages, to the Renaissance. No need to draw upon the imagination. Here are casts and faithful representations of the most important objects that modern research has discovered. The English artisan, with little time for study, and less hope of travel, is, by this means, made acquainted with the works of races whose names were unknown to his forefathers, and familiar with antediluvian monsters, whose pre-Adamite existence was but faintly shadowed out in the griffins and dragons of romance. The Crystal Palace has, like Kew Gardens, especial value for Londoners, for there they may be sure of a real holiday—a day's life in the sweet country air, with "medicine for the mind."

The mention of Kew Gardens brings us to a consideration of the advantages the botanist, and, stranger still, the zoographer enjoy in London. It is all very well for our country cousins to write of their moors and mountains,

and to tramp thirty miles a day after specimens, with their trousers tucked up, and their tin-cases slung at their backs. Let them resort to Kew Gardens as well, and view the luxuriant exotics, the hardy plants of the North, the palm-trees of the East, and the firs of Siberia, all thriving within sight of each other, and they will find the instruction they receive equal to the enjoyment.

For the zoographer and zootomist have been gathered to gather the matchless collections of birds, beasts, and fishes, in the Regent's-park. Visitors, once content with the sagacious elephant and aged camel, and aiming at nothing more than to get the bear up the pole with promissory buns, and see the lions feed, may now study individuals of nearly every known species of quadrupeds. The collection of birds has been increased in the same proportion; while numerous reptiles, and a house-full of zoophites have been newly added.

Another museum that furnishes incentives to improvement and fame, is that of the United Service Club. Here may be seen weapons of every age, chronologically arranged; the different uniforms of the European armies; models of the successive improvement in fighting ships, of harbours; plans of battles, soldiers' beds, Chinese junks, canoes, and other curiosities from foreign seas; and it is most especially interesting and stimulating, now, as being the repository of the heart-rending relics of the Franklin expedition.

Enough, however, has been said to re-direct attention to the great opportunities London affords for self-culture in every branch of science and art. People are sometimes known to live at the foot of a mountain all their lives, and never to take the trouble to ascend it. In the same way we may be apt to overlook our metropolitan advantages, if not occasionally reminded of their importance.

THE METROPOLITAN MAIN-DRAINAGE:

THE DEPTFORD PUMPING STATION AND MACHINERY.*

THAT doubts might be expressed by some authorities as to the sufficiency of valved-pumps for sewage, is shown by the statements made to the Government Commission of 1857, by Mr. W. Husband, who superintended the erection of the machinery for drainage of the Haerlem Lake, and is well acquainted with results of experience in Holland, where the difficulties would not seem to be as great as with the London sewage. Mr. Husband truly says, it is necessary to consider that this sewage "consists of every refuse that can be got into the sewers by an immense population; indeed, in some of the city sewers it is difficult for a man to walk, his legs becoming entangled by *ropy-like offal;* there are also *bricks, wood, and other substances.*" Mr. Lindley, we may add, in his evidence before the same commission, says of the Hamburgh sewers, which are not likely to be worse than those of London, that substances got in, that it "was impossible to account for, such as brickbats, pieces of granite, stone, &c., which were too large to pass through the gratings in the streets;" and though this evidence, with more, is given to show that heavy substances, or weighing as much as 15 cwt., could be moved even through a syphon-dip, and "washed out by the force of the water," it equally points to the tendency which must be apprehended, for valves to become choked by any "ropy-like offal," "wood," or "other substances."

Mr. Husband said in continuation of his previous statements:—

"It is evident, therefore, that pumps are unsuited for the work; wherever there are valves they must become choked; and the pumps would not be lifting water half the time: there would also be frequent breakage."

By the pumping machinery for drainage of the Haerlem Lake, they were enabled to pump 500,000,000 gallons of water in twenty-four hours; but, he says:—

"Although these pumps eventually accomplished the work, yet there was considerable detention, on account of the pump-valves breaking, although the water was comparatively free from drift-wood, &c."

Also that—

"In the London water-works great care is found necessary to prevent floating substances getting into the pumps; a small piece of wood sometimes occasioning considerable damage."

And he—

"Was certain that pumps could never effectually be used for the lifting the London sewage, on account of the grit which would be sure to find its way into and obstruct the action of the pumps."

He therefore recommended an entirely different contrivance.

Of two alternatives, he, in the first instance, preferred scoop-wheels to screws, as being less likely to be obstructed. A reason for preferring wheels to pumps was that—

". . . in case of accident one of the former could be thrown out of gear, and the engine continue its work with another wheel; while with a pump, the engine is so intimately connected, that when the former is stopped, the latter must be stopped also."

We have given some means of judging whether or not these objections pertain to the machinery proposed for the Deptford pumping-station; and it must be allowed that some of those last mentioned are got over by the provision of several engines, and several channels for sewage; so that the question left, irrespective of one of annual outlay, may be whether the engine-power and the troughs and pumps are provided in excess, and sufficiently so, of the demands as they may arise on some ten or twelve days of a year.

The doubt of the sufficiency of pumps with valves is, we need not say, not confined to Mr. Husband. In the same Appendix (of the Report), in which appears the evidence we have spoken of, is to be found a design by Mr. Archibald Slate for an elevating wheel, of which the author says,—

"It is constructed of wrought-iron, on a cast-iron centre, and combines the powers of the ancient Persian wheel and modern dredging-machine, so that whatever comes down the sewer, whether bricks or silt, carcasses, or bales of goods, shall inevitably be lifted with the sewage, and pitched into the upper level."

The delivery would be from the centre of the wheel; and it was proposed to place the contrivance in a building hermetically sealed, and to pass the driving-shaft through a water stuffing-box, so as to prevent escape of effluvia from the agitated sewage. One wheel such as he proposed, the author considered would be equal to several pumps, whilst in cases of emergency, the efficacy might be further increased by increase of power; and he thought that the contrivance, if adopted, would allow of lines and levels for sewers in low districts, which would entail much less cost than the raised aqueducts that otherwise might be required.

The difficulties apprehended in the use of valved pumps, need not be less regarded from the fact that the opinion on what should be substituted for them, given by one of the witnesses, becomes modified on consideration. At first Mr. Husband advised scoop-wheels, on account both of facility and economy of working, and thought them preferable to screws, as being less likely to be obstructed. He said:—

"The velocity in scoop-wheels would be quite sufficient to prevent any deposit at the foot of the wheel, while the case with screws would be very different."

The water raised from the Haerlem Lake by pumps, was lifted a second time into the "Y" by scoop-wheels. One 200 horse-power engine at "Spaerndam," drove ten wheels, 18 feet diameter; and at "Halfweg," a 100 horse-power engine w s erected for driving six scoop-wheels, 20 feet diameter. These wheels "lifted from 2 to 5 feet, were rarely out of repair, and have accomplished the work in a satisfactory manner." But Mr. Husband said:—

"Gratings were, however, used to keep out the drift-wood; and it appears that as the water-way diminishes from the entrance of the water to its eventual discharge, the water should be cleared from substances liable to choke."

Whether from this latter-mentioned experience, or on general grounds, he then proceeds to say that,—

"The machine which, under all the circumstances, seems best adapted for lifting the sewage, is a modification of the open screw, as used in Holland for drainage purposes."

This proposition was explained by a drawing and model, of which the former appears with the Appendix. "The course of the water through the machine being in a line with the sewer," he says there would be but little friction in passing large substances through it; or, the machine being open throughout the length, anything not passing freely could be easily removed. Each screw (laid in the direction of an inclined plane) would be "constructed taper," and with the pitch of the screw increasing towards the top or point of discharge, so that every substance that could enter at the bottom would pass through a channel of gradually increased dimensions until discharged at the top. This arrangement, the expanding channel, Mr. Husband said, "should form an important feature in any machine adapted for lifting sewage." The reverse, as our description at least shows, is characteristic of the particular valved pumping machinery now proposed for the Deptford station. The taper screw, it is considered, would readily pass up large substances, irrespective of specific gravity.

There is much in the Appendix from which we have quoted, in commendation by Mr. Husband of the advantages of his proposed screw, and the screw in general, over the scoop-wheel,—the advantages of either screw or wheel over the valved pump, being considered demonstrated; and it must be admitted that on the engineering question, and that of economy, the statements made from the experience in Holland are worthy of some attention. We may add that scoop-wheels have been used with great success in the fen districts of England.

Besides the objections which there may be to valves for the particular case of sewage, it should not be forgotten that in pumps usually an enormous proportion of the power applied is lost in the passage of the water through the pump. The experiments of General Morin have shown that this loss in some pumps amounts to eighty per cent., whilst there are machines which will raise, with the same power applied, twice the amount of water from a given depth, as the common pump. It is true that part of this loss of power, it is calculated, may be saved by increasing the area of valves, and this increase seems to characterize the pumps shown in the drawings before us. Indeed, we have not thought it necessary to question the propriety of the decision in the present case, though we have considered it necessary to adduce some facts, and to quote the opinions of others.

With reference to the nature and quality of the materials, the specification for the Deptford pumping machinery says of castings, that they "shall be clean and sound, both externally and internally, and shall be carefully fettled and smoothed," the cylinders, air-pumps, sewage-pumps, and plungers being of "mottled grey and white iron, as hard as can be worked," and bored and turned parallel and cylindrical throughout, "no stopping or plugging being on any account permitted" in case of holes or flaws; "nor shall any portion of the castings be made in open sand." Minute directions also are given for the finishing of the wrought-iron work. Parts of the engines, above the floor, to be finished bright, are, after being "properly draw-filed in the direction of the strain," to be "smoothed with fine emery, and finished in the best style of dead polish." "The brasses," it is said, "shall be made of a strong and durable mixture of pure copper and tin, no lead, zinc, or antimony being used therewith," &c.

The contractor is to complete his undertaking on or before the 30th of June, 1861, or forfeit as liquidated damages a deduction of 250*l.* per week from the amount of contract; and he is to provide four foremen, and have charge of the engines for twelve months after the time of their starting. The payments are to be made by instalments; and as regards disputes, the decision of the engineer to the Board as to what is the true intent and meaning of the specification and drawings (whether or not matters or things be particularly mentioned and described) is to be "binding on both parties, to which intent this submission shall be without power of revocation by either party, and may be made a rule of any of her Majesty's superior courts at Westminster on the application of either party."

The drawings of the machinery and buildings, fill thirteen large sheets; and the specification of the machinery comprises thirteen pages. These last end with a form of tender which is to be filled up, and signed, and delivered with the specification attached, to the clerk to the Metropolitan Board, on the 1st of March next. Somewhere about that time the specification for the buildings will be ready, in order that these may be proceeded with for the reception of the boilers and parts of the engines to be first placed or delivered. One reason why the works for the pumping machinery are to be put in hand at once, or before the drawings for the Low-level Sewer are ready, is that the machinery may be available at the time that sewer is in construction, for removal of the water expected to be met with. As regards the low-level district, it should be stated that the present outlets into the river, which may be made available for flushing the new sewer as mentioned, may also be used for the discharge of storm-waters, should the necessity be concurrent with time of low-water; so that really the full demand upon the power of the machinery might not arise, perhaps, a single day in a year, though necessary to be provided for as a possible and a sudden occurrence.

Information of the progress of works in course of execution, which are part of the general scheme of metropolitan sewerage, will be given hereafter.

* Concluded from page 99.

ON THE RATIONALE OF GOTHIC ARCHITECTURE.

MR. SCOTT'S SECOND LECTURE AT THE ROYAL ACADEMY.*

My illustrations have hitherto, perhaps, for the most part, been taken from churches; but the same principle of common sense applies equally to secular structures. Each is treated in a manner suited to its class and purpose. Those classes and purposes differ, as a matter of course, in a majority of cases, from their co-relatives at the present day, as they did in different periods of the Middle Ages themselves, and in the different countries of Europe at any given period; so that the mere fact of such differences existing is no argument against any lesson we may learn from them. I presume, for example, that no great analogy can be established between a Roman villa and one of the nineteenth century in England, and not much between an Italian Renaissance palace of the fifteenth century, and a London mansion of the nineteenth century. Even in Germany and in France at the present day, the houses differ greatly from those in England. The question of the *rationale* of a style is rather, whether it is so flexible and so essentially founded on common sense and reason, that it will readily shape itself to meet practical demands, however varied they may be.

Now, it is scarcely possible for a building of the Middle Ages, and one for a kindred purpose at the present day, to differ more widely in their requirements than did different buildings of the same age; and if the most varied demands of one period are equally met by a given style, why should we fear that the same style would fail to meet variations proceeding from a change of manners and habits?

Take, for example, a Gothic fortification and a Gothic town-hall. Can any requirements be more totally different? In one, the great object was to shut off all communication from without,—external windows must be either wholly avoided, or reduced to mere eyelet-holes;—in the other, the walls are perforated with windows to the greatest extent which the strength of the structure would admit. In one, the entrance must be guarded by all possible contrivances; in the other, it must, as it were, open its arms, widely, to invite the incoming citizens. In the one, the whole expression is one of stern exclusion and frowning defiance; in the other, of busy concourse and festive hilarity. Now, is it possible for these widely differing demands and contrary expressions to have been more perfectly embodied than they are in the feudal castle, and in the halls of the manufacturing cities of Flanders and Germany?

Take, again, the domestic buildings of a Convent, and those of the citizens of a great commercial town. Both, it is true, were human residences, and must provide for the common wants of our nature. Yet in one, the great principle of the foundation was ascetic gravity and religious mortification; in the other, the objects aimed at were hospitality, cheerfulness, and family enjoyment; and in each case the objects were perfectly provided for, as well as expressed in the aspect of the building. Why, then, should we imagine that because our ideas of family comfort are more perfect than the days of our forefathers, the style of architecture which they so successfully applied to purposes differing so widely one from another will refuse to accommodate itself to a more complete form of one of the same purposes? Yet people continually tell us that Gothic architecture is feudal and monkish! Of course the castle was feudal, and the convent monkish. It would have been strange if they had not been so, seeing that one was built for the feudal lord, and the other for monks; but was the town-hall, or the city residence, monkish? Were the warehouses of Nuremberg, or the market-halls of Flanders, feudal? The idea carries absurdity on the face of it. They were, in fact, built by those very communities who had used their utmost endeavours to overthrow feudalism, and were ever most strenuously opposing its authority and influence.

I have in this, and more especially in my last lecture, shown you that the development of architecture itself was founded, step by step, upon common sense and upon practical considerations. In like manner were these made the great principles which guided its application.

In all classes of building, whether ecclesiastical, military, monastic, civic, domestic, commercial, or rustic, though the architecture was, in reality, one and the same, the treatment was *absolutely* and *imperatively* commanded by the purpose and the expression followed by instinct. As I have said on other occasions, a Mediæval barn is as good and as true in its architecture as a cathedral: both are essentially in the same style; yet one is as obviously a barn, and as absolutely subservient to the requirements of a barn, as the other is a church. One has no windows, but slits of some 4 inches wide, and yet looks as Gothic as the other, which has more window than wall.

Take, again, two commercial buildings, as the great Cloth Market at Ypres, and the huge warehouses at Nuremberg,—one for exhibiting manufactures, the other for stowing away goods. The first is, internally, a continuous room or gallery, some 30 or 40 feet wide, and (measuring along its several ranges) about 600 or 700 feet long, its entire sides occupied by continuous and uniform ranges of large windows, and the exterior unbroken, to express the unity of the interior; and its lower story subdivided into rooms of a small size, for more varied uses; and with all this unbroken uniformity it would be hard to find a more wonderfully striking building. The other, being for stowage, demanded multitudinous stories and numerous supports. The stories within are not, perhaps, more than 8 or 10 feet high, and the floors are carried on oaken pillars. The windows, being more for ventilation than light, are small and square, and closed by shutters instead of glass. The crane-houses are made noble structures of timber, but no ornament is admitted, excepting to the doorways, and perhaps the gables. The whole speaks its purpose so unmistakeably, that I do not suppose any one ever yet asked what it was; and though a mere unmasked, and almost unadorned warehouse, it stands forth and asserts—and not in vain—its claim upon public admiration amongst the admired monuments of that truly interesting city.

To go into the various classes of secular buildings, and to show the consistency of their treatment, each with its own proper requirements, would fill a volume,—and a volume, if it did any justice to the subject, well worth reading. I must not now go further. I will, however, point out a few developments demanding our notice. I have before alluded to several points of difference between the windows of secular and ecclesiastical buildings. These differences were carried further and further, according to the demands of the particular building in hand. The windows were wide or narrow, more or less numerous, subdivided or undivided, arched or square-headed, and, if arched, had high or low arches, strictly according to the demands of the rooms within; and whatever these demands were, the architecture was subordinated to them. Some buildings had windows, few and far between: others were nearly all window; and of course there were all intermediate varieties. Some buildings were vaulted in every story, giving good examples of really fireproof construction: others were fireproof through one or two stories, and timbered above; and others, again, had timber floors throughout. In secular structures we find trabeated architecture in its truest form; not stone beams, which, when extended beyond very narrow limits, go against the nature of the material, but real beams of wood, used in a thoroughly sensible and constructive manner. I would particularly call attention to the fact that beams were not merely run into walls, where, the moment the ends so immured decay, down comes the floor; but they were aided by stone corbels, and not only so, but by timber corbels lying on them; or if the bearings were very great, braces were added, which will carry the beams even when the ends are rotted off.

This is trabeated architecture in a very genuine form: I dare say both Greeks and Romans may have used it so too; but as their timbers may have gone to dust, the Renaissance has lost its precedents, and has too often imitated stone construction in wood; or, in more modern works, in lath and plaster; for wood, having disappeared from the precedents, has of late been to a great extent eschewed as a visible architectural material.

Then, again, we have another common-sense development;—the fire-place. The Romans had a number of good methods of warming their buildings, but the straight-forward honest fire-place, the social paladium of the Englishman, we owe, I believe, to the Mediæval builders, the men who are said to have known nothing of modern comfort. There are fire-places in old Norman castles—Conisborough, for example—as good as in a Belgravian house, and the chimney-pieces were often a great deal handsomer. With the fire-place came that other modern feature—the chimney shaft. Look how consistently with common sense and with the principle of decorating what was demanded by utility that was treated.

The oriel window or bay window was another Mediæval invention, and it would be difficult to find a feature more conducive to comfort and cheerfulness. It is often, very sensibly, translated into other styles; but, like the fire-place and the chimney, it belongs to the style of those "*comfortless*" ages of which we are treating.*

The dormer window is another invention of this *window* age. The high roof was not to be thrown away: it must be utilized by being formed into attic stories. Windows, therefore, must be contrived wholly or in part in the roofs. Hence that highly picturesque and useful feature, which, though, like the oriel, now translated into other styles, was invented in the Middle Ages, and, like all their inventions, originated in common sense.

I have spoken of the construction of floors, but omitted to notice the ceilings. Great scope was given to variety in their treatment. Sometimes all the timbers were shown, and perhaps decorated with colour, the woodwork being more or less ornamented as the character of the building demanded. For lofty rooms this often gives a noble covering: in other cases the beams and binding joists are shown, and the intervening spaces panelled: in others, again, the whole is panelled, and in each case any amount of decorative painting used which might be desired. There is no doubt that the ceilings in Gothic buildings were, in many cases, the types which suggested those of the earlier Renaissance buildings (those of which my accomplished colleague has so eloquently treated), before people began to imitate stone construction in plaster and to make quasi-constructive features in hollow cradling. In the Middle Ages, either constructive parts were exposed to view, or the decorations which concealed them were designed simply *as decorations*, without in any degree professing to be constructive; plain, honest, common-sense being the ruling principle, as it ought to be, and once was, in other styles.

One of the most striking ways in which this principle of common sense is displayed is in the absolute freedom exercised in planning, or, more correctly speaking, the absolute subordination of external design to the practical requirements of the interior. There was no love of irregularity for its own sake among the Mediæval builders: on the contrary, they had no objection at all to uniformity where the circumstances of the case did not suggest a departure from it; and where irregularity was demanded for use they did not carry it beyond what the demand required; but, when the practical requirements naturally led to irregularity, they fearlessly followed them without any of that morbid striving after forced uniformity which characterizes — I will not say classic works, for the ancients also acted on more natural principles—but the great majority of modern buildings. That they did not capriciously strive after irregularity is proved by such buildings as the great market-halls of Bruges and Ypres, the latter of which has a front of 450 feet long without one deviation from uniformity, simply because the practical requirements in each wing were identical. That, when the internal requirements but slightly differed, they carried irregularity no further than the demands of reason suggested, is proved by such fronts as that of the Ducal Palace at Venice, and of a very great number of street-houses and palaces in different countries, where the normal idea is uniform, but the windows placed to suit rooms of varying size; but that, when the practical requirements had no reference to uniformity, they fearlessly acted on them without any of those sickly repinings which would so sadly disturb the peace of the modern architect, still more without any torturing of the internal arrangements to make them fit to a preconceived elevation which is the usual practice in these more enlightened days, is abundantly proved by many of the noblest works which our forefathers have bequeathed to us.

Now, far be it from me to say that this honesty of treatment belongs exclusively to Gothic architecture. *It does not.* It is the leading principle of all true architecture; and I have no doubt—indeed we have indisputable proof—that it was acted on by the Greeks and Romans as well as by our own forefathers. The contrary practice seems to be an error rather of our own age than of the genuine periods of Classic art; but, when the defenders of the revived Classic art use it as an objection against Mediæval architecture, we then have a full right to point out its true principles, and to show that it is an exercise of common sense so obvious and reasonable that any style of art which refused it would stand self-condemned, as rejecting the plain demands of reason; and that though I do not hold that Classic architecture stands so condemned, it would be so if we were to admit against it the accusations of some of its own advocates: at any rate it is fair on the part of Gothic architecture to say, that in this great principle of the subordination of external design to internal requirement it not only follows the great styles of architecture which preceded it, but that in the opinion of its opponents it carries out the great utilitarian principle even to an excess. There can be no doubt that the principle is pre-eminently in harmony with the genius of Gothic architecture; more so, probably, than with any other; and if those who think it a vice desire to saddle it exclusively on our style, they cannot complain if we, who hold it to be a virtue, at the least claim for that style the lion's share of the credit.

I do not for a moment dispute that there is room for excess even in acting on a principle so reasonable. If we were to make it an excuse for careless planning; if we were so affected as to seek excuses for irregularity when the arrangement, if carefully considered, offered none; or if we neglect reasonable means of avoiding them when it can be done without any injury to the arrangement, we are clearly open to the charge of excess; but, on the other hand, if we were to avoid irregularity by making two essentially different parts look alike at the sacrifice of their practical demands; if we place windows in inconvenient or unsightly positions in the interiors of our rooms for the sake of making them match some windows in an opposite wing, or to form a regular range disagreeing with internal divisions; if we make sham windows where none are wanted, or omit real ones where they would be useful; or if we torture and displace our rooms to obtain uniformity, or play any of the thousand tricks which are too current amongst us to make our exteriors uniform where our interiors are the contrary, surely we are guilty of a far more culpable excess in the opposite direction; for the exaggeration of common sense is unquestionably a more venial sin than its renunciation. However this may be, Gothic architecture, whether rightly or wrongly, looks to internal requirements as paramount to external regularity; places its windows rather with reference to the rooms within, than to the elevations without; and rejoices in making the exterior express in some degree the changes of purpose in the internal arrangement; but it does not reject uniformity where compatible with truth and utility, nor refuse to admit of careful artistic combinations of parts so long as they are made subservient to, or at least do not militate against, practical requirements: as I have said before, I believe it only reflects and carries out more perfectly the principles of *true* Classic art; and that, if these principles are often forgotten or rejected, it is, in the main, an abuse of modern

---

* Concluded from page 100.

* On the question of comfort, no one is, perhaps, so good a judge as the practical house-decorator and upholsterer, particularly where his engagements include houses of the highest class and all styles. I therefore feel much pleasure in giving the following extract from a letter I have received on this subject from Mr. Crace:—

"In carrying out the interior finishing of a Gothic building, I know of no rule or principle which should oblige me to give it a dull and heavy character. On the contrary, this style allows of light and cheerful effects, the same as in any other. I will instance the house of the late A. W. Pugin, which he built for himself at Ramsgate. What could be more delightful than the room in which he always sat and worked? The walls were ranged with books. The mullioned windows, of good size, were filled with plate glass, except in the upper part, where was stained glass. These windows commanded a most beautiful sea view. He sat always near one of them, at a large convenient table, on which was his drawing-board; and from time to time he would raise his eyes from his work, and refresh them with a look at the sea, ever varying, and always delightful to him. His chairs were, I consider, the most comfortable I ever made, and yet he declared they were essentially in keeping with the style. No room was ever more cosy-looking, better lighted, or more cheerful, than this sanctum of the great apostle of Gothic art revival. His dining-room was equally good in its way; and as for its fireside, I defy any Classic house to have one so enjoyable. He had arranged the fireplace, with infinite taste and good effect, in a recess, and on each side were settles, so that a friendly party could there snugly ensconce themselves with every inducement to sociability. . . . . The bed-rooms were all prettily papered, and supplied with every useful requisite, simple and plain, and all were perfectly light and cheerful-looking. Recently I have been employed, at your recommendation, in the decoration and furnishing of a house near Dorking (rebuilt by you), in the Mediæval style. I am sure I may be allowed to say that no house was ever better lighted, or more agreeable in its general aspect. All the modern appliances for comfort used in other houses are here introduced with perfect propriety. Each room is finished appropriately to its particular use. In the drawing-rooms the walls are hung with light green paper, relieved with gilding: the woodwork is white and gold: the ceiling and cornice are lightly relieved with ornament in colour and gold, on a white ground; and all the rooms look cheerful and comfortable. They are not, indeed, of a monastic character, and yet I do not think that a judge of Mediæval work would find much fault with the treatment in detail.

In furniture this style offers great facilities, for the principles of its construction are the source of its decoration. There are no effects produced in the Classic style but can be equally well obtained in the Mediæval. It was the mistake of a by-gone time, when the true principles of Gothic work were entirely misapprehended, to imagine that stone-pattern pinnacles, and tracery, were appropriate to furniture. Gothic chairs and sofas can be as comfortable as any other. What a beautiful piece of construction is the Glastonbury chair; how appropriate, and how easy to sit in, though made at a time when the wood comfort was not known. As for cabinets, tables, and sideboards, besides being constructed on better principles, it is less costly to produce in them an ornamental effect than in works of the Classic style.

There are no modern silks and Damasks equalling in richness and beauty of design those of the fifteenth and sixteenth centuries.

I work in all styles. My duty and my business is to make the interior finishing of a house correspond with its general architectural character, whether it be in the Classic or Mediæval style; and I declare that there is no impediment of style which would prevent the interior of any castle, or Gothic domestic building, being fitted up with the same amount of elegance, convenience, simplicity, or splendour, as that of an Italian villa, or a Roman palace.—Believe me, my dear sir, very truly yours,

JOHN G. CRACE.

Wigmore-street, January 31st, 1860."

date. It is, however, beyond all question, inherent upon that form of revived Classic art with which we are surrounded.

The same may in fact be said of truthfulness in minor things. It would be unjust to father the contemptible and endless fallacies of our own day upon Classic architecture. It is true that they pervade and saturate many of the modern productions of that style, and that the revival of Gothic architecture has somehow led to their exposure; but the truthfulness which we are proud to claim as one of its great and leading stars, we freely yield as the property not of one style but of all noble architecture.

Did time permit, I might follow up the *rationale* of the style under consideration as evinced in the judicious employment and treatment of, and the mode of workmanship applied to, different materials as well as different branches of artistic decoration. The Mediæval architect adopted the material he could most readily obtain, and adapted his design to suit its peculiar qualities.

If he used block stone throughout his work, or united it with rough walling-stone or rubble; or if his building were of brick or flint or pebbles, he studied to use them so as to look well and to aid the effect by their variety. As instances of this I will refer to the exquisite stone and flint structures in the Eastern Counties, and the interstratification of freestone with the thinnest rubble in some of the oolitic districts; to the brick domestic architecture of Norfolk, of Northern Germany, and of Lombardy, and to the timber structures of innumerable districts and cities; to the variously coloured stones in the buildings in Auvergne; and, last, but not least, to the magnificent marble structures, with their inlayings and mosaics, which delight us when in Italy. The great principle was how best to utilize the materials which nature had provided: where nature had been chary in her gifts, even external plaster was not despised, but truthfully made use of: where she had been lavish, even precious stones were used as building materials, as at Prague, where there is a chapel whose interior is faced with a kind of rubble work of polished amethyst, the stones being cut through, but otherwise unshaped, and irregular jointings being covered with embossed gilding.

In metal work, each metal was treated on its own merits and its own natural characteristics. I give an extract.*

In decoration, frescoes, mosaics, tapestry, needlework, enamels, &c., were profusely used when means permitted. Indeed nothing was rejected either on the score of homeliness or expense, provided it suited the work in hand and the means at command.

But what, I may be asked, is the utility of tracing out evidences of a fact so probable on the face of it, as that our forefathers acted upon reason when engaged on so practical a thing as architecture? I would reply that its utility is twofold. In the first place, we have too much lost sight of the *rationale* of architecture, and of the necessity of acting upon it. I do not wish to rip open old sores, or to object against others, errors of, which we are all of us guilty. Let us each examine ourselves and ask ourselves how far we act upon truth and reason in our designs; and, if compelled to admit our derelictions, a review like that on which we have been engaged may not be otherwise than useful, quite apart from any question about what style we are working in.

In the second place, it is an undoubted fact, as my able coadjutor said the other day, that we are at a transitional period of our art—that we are dissatisfied with the present, and aiming at an altered future; and that some of us are following up that aim on the basis of a revival of the style of which I have been treating; while, as he also truly says, there is a *vis inertiæ* in art which is not easily overcome, but yields reluctantly to change. How important, then, is it to us to know that the style we are reviving was itself based, as all good architecture must be, on the firm rock of common sense; and how essential to our success that we should place our revival on the same basis! Shall we, then, secure this object by doing only *what* our forefathers did? By no means. Rather, as I have urged in a former lecture, let us do *as* they did; that is, *act upon reason*. They thoroughly suited all their works to their varied objects. Let us do the same, how much soever more varied our requirements may be. They made their houses comfortable to the extent of their habits. Let us make ours so to the greatly increased extent of our own habits. They welcomed every invention as it arose. Let us do the same, by the invention of our own prolific age. They utilized every material which presented itself to them. Let us do so by all the materials which modern science or ingenuity has placed at our command,—only let us do all this truthfully and consistently with reason. For example, if we meet with an invention suited to the surface decoration of rooms, but devoid of constructive strength, let us use it *as* a surface decoration, and not, as is too commonly done, make troughs and pipes of it, and pass them off for beams and columns. If we admire a vaulted construction, by all means let us use it; but do not let us emulate the vaulting of Diocletian's Baths, and Westminster, or the domes of the Pantheon of St. Sophia, in lath and plaster! If we want plaster casts of ancient monuments, let us place them in our museums; but, for goodness sake, let our buildings themselves be real!

The conditions to be demanded of our future architecture, whether destined to be based upon the Classic or the Gothic Renaissance, or whether they are to continue ever, as now, to assert, side by side, their rival claims, are a perfect and unhesitating fulfilment of practical demands, whether of construction, convenience, or comfort; an equally unhesitating adoption of the materials, inventions, and mechanical and constructive appliances of the age; a capability of reasonable economy or of judicious magnificence, in all degrees and proportion; a character at once noble and in harmony with the country and climate and with national associations; a perfect *freedom* of treatment, united with perfect truthfulness; and a free admission of the sister arts in their highest and most perfected forms. How happy would it be for art if we could proclaim an armistice between rival styles, while the advocates of each devote heart and soul to the realization of those conditions so obviously demanded of reason and common sense!

That Gothic architecture is in its spirit well fitted to unite these conditions, I think, may be judged by much that I have shown you in this and the preceding lecture. It lays claim in a pre-eminent degree to the character of *freedom*. Free in its use of arcuated or trabeated construction, as may best suit each particular case; free in the form of its arches, which, in addition to those used in other styles, assumes other and excellent forms which enable them to assume all possible proportions of height to span; free in its vaulting, which has peculiar facilities for adapting itself to every possible space and plan; free in the proportions, as well as infinite in the varieties of its columns; free as air in the sculpture it applies to their capitals, as well as to other architectural uses; free in the pitch of its roofs; in the size, number, form, and grouping of its windows; and, above all, absolutely free in its planning, in which the practical requirements of the interior have undisputed sway irrespective of external design. It seems as if it could not be otherwise than suited to an age in which freedom is the great point to be aimed at in all we undertake. Convinced that such is the case, let us devote ourselves, hand and heart, to the task: let us bring all our energies to rendering the style we select as our groundwork, really, and absolutely subservient to the wants and to the spirit (so far as it is a healthful and a truthful spirit) of our age: let us apply to the work all our reasoning powers, and found all we do upon common sense; but, let me not be mistaken,—this cannot be done by a mere abstract effort of the mind. Let me, therefore, urge upon you who are students, to exercise your reason and common sense in another way? and to be assured of this, that you cannot succeed in the practice of an art, unless, in addition to all the practical considerations I have had occasion to allude to, you make yourselves, in the strictest sense of the word,—*artists*.

* In a letter which I have received from a high practical authority—Mr. Skidmore, of Coventry,—on the subject of the practical reasonableness of the modes of workmanship applied to metals by the Mediæval artists, he shows most clearly, and expresses a very strong opinion on, the superior *rationale* which guided them in their work, to that which is now, for the most part, acted upon. He shows that the true measure by which to judge of such a *rationale* is the degree in which the artist brings out and turns directly to account the peculiar qualities of his material; that in modern work this is very much neglected, and that designs for metal-work are made with little or no regard to the capabilities or qualities of the metal to be used; indeed, are modelled in clay just as if they were to be executed in marble or alabaster, so that, if the "piece of plate" were painted over, no one would be able to guess of what material it was formed; that even when any regard is paid to the material it is usually to *one* only of the qualities of a metal, and that, perhaps, its lowest and least distinctive quality, inasmuch as metals possess it only in common with many other materials,—I mean its susceptibility of being cast in a mould; whereas the Mediæval artist, without neglecting this, gave greater prominence to the qualities of malleability, ductility, the facility for receiving engraving, inlayings (such as niello, &c., enamelling, and filigree-work), and other qualities peculiarly metallic, and differing in different metals: so that, on the whole, their mode of treating metals was far more rational than those which are, for the most part, prevalent amongst ourselves, in which these peculiarities, though of course well known and more or less acted on, are in a majority of cases neglected.

ON BUILDING-STONES—THE CAUSES OF THEIR DECAY, AND THE MEANS OF PREVENTING IT.*

IN a district of so peculiar a nature as the environs of London (where clay of a highly plastic description occurs in great abundance), the style of construction adopted is so markedly characterized by the use of the local material, bricks, that we, inhabitants of London, are apt to forget that other districts are, as it were, compelled by analogous circumstances to adopt a style which is diametrically opposed to our own. In London, and, indeed, we may add, in a large majority of our centres of population, bricks are habitually cheap and good; stone is rare and expensive; and it thus happens that stone becomes to us an object of luxury, only to be employed in monumental structures, or in the decorative parts of ordinary houses. In France the contrary rule prevails, as it does likewise in some of the cities of Yorkshire and of Scotland; and there stone is the common material used in building, and brickwork is the exceptional ornament. It has always seemed to me a matter of regret that this should be the case, for, beyond question, the taste of the London builders has been injuriously affected by the small and unbending character of the material they habitually employ; whilst the grander and more monumental appearance of such towns as Edinburgh, Bradford, Paris, &c., may, to a great extent, be attributed to the fact that in them large ashlar stone is habitually employed. But in addition to this æsthetical inconvenience arising from the absence of building-stone as an ordinary material of construction, the builders of such towns as London labour under the more serious one of being less acquainted with the nature and properties of stone than are the builders of more favoured localities; and we, therefore, find that even when the former do resort to the more costly materials, they frequently employ them under such circumstances, and in such positions, as to expose them unnecessarily to danger and decay. Emphatically this has been the case of late years with many of the London buildings, and it may, under such circumstances, be desirable to dwell for a short time upon the nature of the stones which usually appear in our market, and upon the various injurious actions to which they are exposed.

* Read by Mr. G. R. Burnell, C.E., at a meeting of the Society of Arts, on Wednesday evening last, Mr. Godwin in the chair. At the close of the paper a discussion ensued, in which Professor Ansted, Mr. R. Hunt, F.R.S., Mr. C. H. Smith, Mr. Warrington, Professor Tennant, and the chairman, took part, and to which we shall hereafter refer.

The building-stones employed in London are capable of being divided, according to their mechanical properties, into two classes,—namely, those which can only be worked by the pick or by wedges, and those which can be worked by the mallet and chisel,—the latter being known by the name of freestones, in contradistinction to those which do not work freely. These classes, in their turns, are susceptible of numerous subdivisions, such as, in the first class, the granites, porphyries, basalts, whinstones, and the countless varieties of the plutonic and volcanic formations; the quartz rocks, mica schists, gneiss, and the more dense altered quartzose sandstones, the quartzose conglomerates, and the grès or agglutinated sandstones of the secondary and tertiary strata. The slate rocks, perhaps, might be grouped as a subclass of the stones not workable by the mallet and chisel, for they present too decidedly marked a cleavage to allow of their being worked freely, though they are susceptible of being sawn, or even worked on the edge, in the same manner as the freestones themselves. In the second class, or the freestones, are comprised the marbles, sandstones, limestones (both carbonates and sulphates), in all their endless modifications. The bituminous rocks furnish materials which may be classed as a subvariety of the freestones, in an analogous manner to the classification of the slate rocks in the preceding division.

Now, of the stones above described as being of the first class, the London market consumes large quantities of granite from the Channel Islands, Cornwall and Devonshire, Mount Sorel, in Leicestershire, Aberdeen and Peterhead, in Scotland. The Whinstones, basalts, and volcanic tufas are hardly ever seen here—unless in the form of the pouzzalanos and trap, which are occasionally imported from Italy and Germany for making artificial hydraulic cements—whilst the quartz rocks and the quartzose sandstones, the mica schists, &c., are never used. The quartzose conglomerates, such as the Bramley Fall stone, are occasionally employed in engineering works, and the tertiary grès, or sandstones, of Windsor forest are used in the neighbourhood of Windsor as paving materials for streets and stables, just as the grès of Fontainbleau, their geological analogues, are used in Paris. The advantages offered by the best of these various materials consist in their extraordinary hardness, their density of texture, their non-absorbent properties, and, generally speaking, their powers of resisting atmospheric influences; but the whole of this class is exposed to the serious objection that the labour upon all its varieties is very costly; and that from the mere fact of their being composed of heterogeneous ingredients in the far greater number of cases, they are also exposed to the action of causes which are able to produce either disintegration or decomposition of their elements.

Thus, for instance, the Cornish and the Devonshire granites, and some of the porphyries and elvans from those counties, frequently contain a notable proportion of felspar; and, when they are exposed to the action of rainwater, containing (as it usually does) carbonic acid in solution, that felspar decomposes, and is then easily removed, leaving the quartz and the mica in relief without any cementing material. Illustrations of this mode of decay may be observed in the granite used in parts of Waterloo or London Bridges, or in the granite piers of the crypt under the hall of Christ's Hospital; but the process is very slow, and it would seem to be subject to some laws not hitherto discovered; for the decay of the felspar does not take place according to any known rules. The more crystalline, in fact, the felspar of any of these bodies may be, the more perfectly does it resist the decomposing action of the atmospheric agents; and we shall have occasion again to allude to the influence of this mechanical state of natural substances upon their durability. In the meantime it may be added, that in the Bramley Fall and in the analogous stones, the silicious conglomerates, the same phenomena may be observed. The cementing material frequently decomposes, and is washed away from the ingredients it naturally held together, and then the latter, as certainly, fall asunder, or the cementing material decays, and in so doing it produces a dangerous disintegration of the mass. It follows, from these observations, that the smaller and the more uniform in dimensions the materials of these heterogeneous rocks may be, the greater is the probability of their duration, and in the case of granite especially, it is essential to select those descriptions which do not contain large crystals of

felspar. It is singular that some of the granites of Normandy, Brittany, and the north of Spain, present identically the same mineralogical peculiarities as the granites of Devon and Cornwall, and they are equally susceptible of decay. The varieties in the lithological characteristics of the Bramley Fall stone, and in those of the quartsoze conglomerates, are still more hard to define than even those of the plutonic rocks: in the same quarry, and even in the same bed, the qualities of these stones will change within a very small distance; and the great irregularities of this description of stone form, in fact, the most serious objection to its use. Nevertheless, when the Bramley Fall or the silicious conglomerates are well selected, they are extremely valuable for engineering purposes, on account of their hardness, and on account of their resisting crushing weights. They yield to atmospheric influence when the silicious cement exists in the soluble silica, and is of an amorphous character: if, on the contrary, the cement assume a crystalline character, it becomes unattackable even by caustic alkaline solutions, and the silicious conglomerates are then as durable as the best descriptions of granite themselves. Of the granites which are used in London, those obtained from Aberdeen, Peterhead, and Mount Sorel are the most valuable, but also, on account of their hardness, the most expensive. They can be obtained of any required dimensions, and are capable of receiving any desired form, and thus are admirably adapted for the construction of buildings of a simple monumental character, designed "not for an age, but for all time:" their colours, moreover, are agreeable, especially those of the rose-tinted granites of Peterhead and Mount Sorel. The best silicious conglomerates used in London for building purposes are extracted from the lower members of the Yorkshire coal-field: their colour, it may be added, is far from being as agreeable as that of the good granite; and at times, when there is much oxide of iron in the cementing material, the colour of the conglomerates becomes unpleasantly foxy.

For the reason above cited, namely, the difficulty of working the first class of stones, the other, or the freestone class, is the one most generally used in building operations, the selection of the variety employed in any locality being too often only regulated by the consideration of its ultimate cost. In London, the freestones commonly used may be stated to be as follows:—amongst the sandstones, the Cragleith, the Dundee and Arbroath, the Yorkshire stones, and the sandstones furnished by the Wealden deposits near Tonbridge Wells, or by the subcretaceous formations of the neighbourhood of Godstone, Maidstone, or Folkestone; amongst the magnesian limestones, the Anston and Bolsover stones; amongst the carbonates of lime, the Portland, Purbeck, Ketton, Barnac, the Caen, Ranville, Aubigny stones, are to be met with in commerce without difficulty, whilst it would be easy to increase their number by the introduction of the remarkably valuable tertiary limestones of the Paris basin. In some localities, even the common chalk becomes so indurated as to allow of its being used as a building stone; less frequently, it is true, in England than in France, for in the valley of the Lower Seine this material is extensively used in the best buildings, as at Rouen, Vernon, Louviers, &c. I dwell a little upon this detail of our subject at present, because I am convinced that a process for the preservation of building-stones, which I shall have the honour to bring before your notice, would enable us to convert to useful purposes of construction the immense stores of chalk with which we are surrounded. I would add that the sulphates of lime are occasionally used for ornamental purposes in interiors, but they are almost invariably so unfit to resist the action of the atmosphere externally, as only to be of value from the fact of their yielding the important material known by the name of the "Plaster of Paris." The argillaceous limestones do not often occur under such conditions as to warrant their use as building materials in other than in the localities where they are found, and this sub-class is only resorted to, for the London market at least, for the purpose of obtaining the hydraulic limes of the blue lias, or the Roman cements, made from the septaria nodules of the Oxford, liassic, or London clays.

The Cragleith stone, of which the majority of the buildings of Edinburgh are constructed, is occasionally used for foundation or basement works in the metropolis, or for the execution of staircases exposed to great traffic; but the hardness (and the consequently high price of labour) of this stone limits its use to such situations. It is obtained from the carboniferous formation, and is composed of minute grains of quartz, with occasional plates of mica, united by a silicious cement, containing usually about 98 per cent. of silica, 1 of carbonate of lime, and one of bituminous and other miscellaneous ingredients. The weight of a foot cube of the Cragleith stone is about 146 lbs., and it is stated to resist a crushing weight of 5,800 on the inch superficial. Generally speaking, the colour is of a greyish white, and, in consequence of the density and the non-absorbent character of the material, it retains a clean appearance for a very long time. The London atmosphere has very little action upon it.

The Dundee and Arbroath stones, obtained from the red sandstone series on the eastern coast of Scotland, are sometimes employed in London; the former as an ordinary building stone, the latter principally as flag pavement. The colour of the Dundee stone hitherto brought to London is rather disagreeable, for it is of a dark purple brown, or a deep oxide of iron tint, but the stone is hard, and resists weather very satisfactorily: in consequence of the colour, however, this material is never used in ornamental buildings. The Arbroath stone is of a denser character than that obtained from Dundee, but it is more decidedly "flaky," to use a workman's phrase, and it is, therefore, almost exclusively used for the purposes above mentioned. Occasionally, however, blocks of the largest dimensions, and of very uniform character, are obtained from the Arbroath quarries. They are hard: they resist weather satisfactorily: the stone is easily worked, and its colour (a light greenish grey) is far from being disagreeable. I am not aware of any observations upon the specific gravity of this stone, or of the crushing weight it would bear; but, judging simply by the eye, I should be disposed to class it in these respects with the Yorkshire sandstones, to be noticed hereafter. As Arbroath lies immediately upon the seaboard, it is strange that the stone from that locality should not be more commonly used in the metropolis.

There are several varieties of the Yorkshire sandstones used in London, of which the most generally known are the flagstones from the neighbourhood of Halifax and Huddersfield, and the compact stones from the neighbourhood of Leeds, commonly called the "Park Springstone." The normal composition of the whole of this series of rocks is that of a fine-grained quartsose sand and decomposed felspar, with an argillo-silicious cement, and with numerous flakes of mica in the planes of stratification: sometimes the mass is coloured by the presence of the oxide of the silicate of iron, and the colour varies from a decided blueish-green to a light ferruginous-brown. The weight of a foot cube of the paving stone is about 145 lbs.; and the crushing weight it can support may be considered to be nearly equivalent to that of the Cragleith stone, a remark which, by the way, may be extended to the Arbroath stone. It is worthy of especial notice that although the Yorkshire flags absorb water freely, and part with it in as easy a manner, they do not suffer from the action of frost; it may be because their distinct lamination allows the expansion of the water to take place freely in a horizontal direction. But when the Yorkshire stones are used in elevation (that is to say in vertical walls) they are not able to resist the singular destruction which takes place at the extremity of the zone of capillary action in almost all porous stones. They do not, in fact, to use another workman's phrase, "stand well between wind and water," and should not, therefore, be used in the basements, or in plinths, of buildings immediately in contact with damp earth, or in positions to which water has access at irregular intervals.

The Tunbridge sandstone has been occasionally introduced here, but with very satisfactory results. No doubt it would be possible to select stones from the Wealden deposits of Tunbridge or elsewhere, which would resist the action of the atmosphere; but with the exception of the limstones of this series of deposits, to be noticed hereafter, the materials derived from these beds are of far too irregular and too dangerous a character to allow of their being used at any distance from the place where they are obtained.

The sandstones of the subcretaceous rocks are also of a very irregular character, and even when of the best quality they are but ill qualified to resist alternations of wetness and dryness. Nevertheless, the Godstone and Maidstone firestones, as they are called, are of great value in the arts, on account of their powers of resisting the action of fire, through the large quantity of soluble silica they contain, in connection with a certain proportion of the carbonate of lime. When these stones are used for ordinary building purposes they require to be kept above the ground, or the influence of capillary attraction upon the moisture it may contain, and also to be protected from rain, by being covered with some impermeable material. If these precautions be observed the firestones do not rapidly decay; and in some of the oldest parts of Westminster Abbey, or of the Temple Church, specimens of them may still be seen in a fair state of preservation. For internal elaborate Gothic tracery, the firestones may be advantageously employed, because the ease with which they are worked reduces the cost of labour of such decorations. The colour, a greyish light-green, is far from being unpleasant.

Whilst thus speaking of the subcretaceous building stones, it may be as well, even at the risk of a little departure from the strictly logical classification according to the nature of the materials, to call attention to the Kentish rag, which is now so extensively used in the modern revival of Mediæval architecture. This stone is a limestone, with a very small proportion of earthy matters, frequently subcrystalline, but ordinarily of a confused texture, the beds from which it is obtained varying from about 6 inches to 3 feet in thickness, and the colour varying from a lightish green to a deep blue. The stone is, when well chosen, very hard and dense; and indeed the labour upon it is so expensive that it is very rarely that the ragstone is used for anything but rubble masonry, in districts remote from the quarries. It is the custom, at the present day, on account of the expense of working this stone, to execute all the moulded or decorated part of churches, &c., in Caen or Bath stone, and even to carry up the quoins of those materials, whilst the intervening spaces are filled in with the hard rag. In other words, the exposed parts of such fashionable specimens of constructions are executed of soft and yielding materials, whilst the protected parts are executed of hard and durable ones. However, the walling thus produced is certainly picturesque in its effect; and if some of the process for the preservation of the softer stones, to be noticed hereafter, be applied to the Caen and Bath quoins and copings, or weather-tables, there can be no valid objection to the use of the Kentish rag in connection with them, on the score of the durability of the work, at least.

Of late years, in consequence of the report of the commission named for the selection of the building stones for the new Houses of Parliament, the magnesian limestones, from the Anston and Bolsover quarries, have been largely used in the metropolis,—in some cases, as in the Museum of Economic Geology, with tolerable success; in others, as in the Lincoln's-inn Library and the Houses of Parliament, with a precisely opposite result. This discrepancy proves at least that the magnesian limestone is quite as much exposed as any of the formerly used building-stones to great varieties of composition, and, therefore, much attention must be paid to its selection and mode of application. The colour of the best varieties of this stone is of an agreeable light-warm and slightly ferruginous brown: its density is rather greater than that of the oolites; the labour upon it is intermediate between that upon the Yorkshire or the Portland stones, and it can be obtained in blocks of any required dimensions. For many reasons the use of a stone presenting the external characters of the magnesian limestones would be very desirable, and it must be a subject of sincere regret that so little care should have been displayed in the selection of the varieties employed for the important buildings we have above referred to. The decay of the stonework in the Houses of Parliament is really painful to witness,—I had almost said shameful.

With the exception of the Purbeck stone, which is obtained from the local modification of the Wealden deposits found in the Island of Purbeck, the Isle of Wight, and near Petworth, the other freestones, before cited as being used in London, are obtained from the oolitic series. It must not, however, be understood that the oolites are the only valuable sources of supply, for very valuable limestones, adapted for building purposes, are to be found amongst the transition rocks and the mountain limestone districts of Devonshire and of the Midland counties; whilst the blue lias itself is frequently adapted to such uses. But, in the first place, the materials yielded by the transition, and by the mountain limestones are so hard, and so difficult to work, that they are never able to be used beyond the immediate neighbourhood of the quarries; and in the second place, the purer varieties of the limestones from the blue lias series, are so irregular in the thickness of their beds and

in their powers of resistance, that they are equally avoided in general use. The tertiary limestones of the Paris basin might no doubt furnish building materials of a very superior description to those usually employed; but they are, comparatively speaking, unknown in England, and certainly they never appear in the London market. In fact, the only limestones habitually used in the metropolis, are those obtained from the oolitic series, and amongst them the Barnack, Ketton, Ancaster, Portland, Bath, and Caen stones, are those which are most generally known to our architects and builders.

Of these stones, the Barnack stones, obtained from the oolite of Northamptonshire, figure to some extent under a false name, for the real Barnack quarries have long since been abandoned, and in its place the Casterton stone is now commonly employed. Both the original Barnack and the Casterton stones are of a lightish brown colour, and they are composed of a tolerably pure carbonate of lime, of a compact but oolitic character, and containing an infinite number of fragments of pearls and corals. Their specific gravity is about 2 090: the crushing weight (instantaneous) would seem to be about one-fourth of that of the Cragleith stone, though there are some marked discrepancies between the results obtained from the respective materials. Nearly all the Mediæval structures of Cambridgeshire, the Isle of Ely, and the North of Suffolk, were executed in the Barnack stone, which certainly has resisted atmospheric influences in a very remarkable manner, when care had originally been taken to select for the more dangerously exposed positions the less earthly varieties.

The Ketton oolite, which was largely used in the construction of the numerous beautiful churches in Northamptonshire, and has even of late years appeared with successful practical results even in London itself (as in the tower of St. Dunstan's-in-the East), is very much like the Barnack stone in colour, but it is more regular in its characters, harder, and more difficult to work, and from the singular apathy of the quarry holders, it seems even to be more costly in the first instance. The colour of the Ketton stone is of a rather warm cream-colour: its specific gravity is about the same as that of the Barnack stone, and the crushing weight it will bear is rather greater than that required to destroy the latter. If this material could be brought at a cheap rate to London, there could be little doubt of its being extensively used; for the original colour is decidedly pleasant, and the London atmosphere seems, from the state of the tower of St. Dunstan's, to have very little action upon the Ketton stone, either in producing decay or in changing the colour.

The Ancaster oolite is obtained from Lincolnshire, and it is largely used in our midland counties, on account of the beauty of its grain, its pleasant colour, and the ease with which it is worked. Its specific gravity is greater than that of the Barnack stone, and its cohesive force is also greater. This stone is, however, but little known in London, and until it has been exposed for some time to our peculiar atmosphere, it would be dangerous to pass a decided opinion on its merits. In Lincolnshire and the Midland Counties, the Ancaster stone, it may be observed, has resisted the ordinary causes of decay very satisfactorily: and, with proper care, there can be no *primâ facie* reason why it should not succeed in London.*

DR. DAUBENY ON THE SEWAGE QUESTION.

Dr. Daubeny, Professor of Rural Economy in the University of Oxford, recently delivered in Oxford a lecture "On Sewage, with special reference to Baron Liebig's remarks relative to the system of disposing of sewage adopted in the principal cities of this country."

The lecturer remarked that when a man of Baron Liebig's extended European reputation lifted up his warning voice to the British nation on a subject on which he had a right to speak with authority, and staked, as it were, his character as a man of science, by foretelling the ruinous consequences of a system in which the inhabitants of our large cities are embarked, it seemed to be the duty of all who thought they could either directly or indirectly influence public opinion, to secure, if possible, a calm and impartial hearing to the arguments advanced. He proceeded to point out three methods by which it had been attempted to render the sewage of large cities available for agricultural purposes. The first of these methods was to detain the excrementitious matter in its passage towards its outfall for a sufficient time to allow of the solid matter suspended in it to deposit itself, and then to collect this portion as a manure; the second arrived at the same object by a different expedient, viz., by bringing about a separation of the solid matter from the water, which was its vehicle, through the instrumentality of certain chemical re-agents; and the third was to convey the whole in a liquid state to the very spot where it could be usefully applied, by the aid of pipes and other mechanical contrivances calculated to supersede the necessity for employing cartage and vessels capacious enough to contain so bulky a material. The first of these methods was adopted at Cheltenham, the second at Leicester, and the third at Rugby. It would appear, however, that except in a few small places, like Rugby, which scarcely held out an example which great cities could safely imitate, no successful method had as yet been discovered for combining the sanitary with the economical object sought, and accordingly in London, the public appeared to have acquiesced in a plan which, at a vast expense, was intended to carry off the filth of the city to a distance, and disregarded altogether the agricultural value of the material itself. It was against this procedure that Baron Liebig entered his protest. It might be urged by a practical man, in defence of the metropolitan system, that the valuable constituents of the manure were equally sacrificed under the old *régime* as they will be when the new arrangements are brought into complete operation; that, although cesspools might exist, their contents were rarely made available for the purposes of agriculture, and that no more use was made of the manure, when poured into the Thames in the immediate proximity to the city, than will be the case now, when it is conveyed to a distance of many miles. Thus, the sanitary object, at least, was provided for, whilst the economical question stood upon the same footing as before. The authority of chemists of great eminence might also be appealed to, who reported, as the result of their investigations, that in their opinion no profitable application of the sewage of London to useful purposes that could be adopted on a large scale has up to the present time been suggested. Those and similar reasons, however, although they might serve by way of apology for embarking in the present system in lieu of a better, left untouched the main argument advanced by Baron Liebig, and could not justify us in a blind acquiescence in the system pursued as one intrinsically good. The transport of the sewage matter to a distance from the metropolis had, indeed, become, with the present arrangements, a matter of paramount necessity, but the accomplishment of that end ought by no means to stifle the inquiry as to whether some means ought not to be devised for rendering the same material available for useful purposes. If the citizens of London were as fully impressed as they ought to be with the importance of the subject, if they could realize the enormous pecuniary loss they are at present sustaining by the system pursued, they would not quietly acquiesce in the report of those chemists who have expressed doubts as to the practicability of employing their sewage for agricultural purposes, but would persevere in putting both science and capital into requisition until the difficulties had been surmounted.

* To be continued.

STRENGTH OF IRON SHIPS.

MANCHESTER PHILOSOPHICAL SOCIETY.

At the ordinary meeting, February 7th, Mr. W. Fairbairn, F.R.S., President, read a communication "On the Strength of Iron Ships." The writer said,—

Recent disasters have recalled to recollection numerous defects in the construction of iron vessels, more especially in their powers of resistance to a transverse strain. When we consider the enormous amount of life and property that is at stake, and dependant upon the security of these vessels, it is assuredly a duty to point out the defects in their construction, and the remedies which it is necessary should be applied.

Vessels of a length equivalent to eight or nine times their breadth of beam are subjected, when pitching in a heavy sea, to two distinct kinds of strain. First, when rising on the crest of a wave, the ship is supported in the middle with the stem and stern partially suspended; and, secondly, when supported at each end and suspended in the middle, as the waves roll under her. In these ever-changing positions it is obvious that her deck, as well as the lower parts of the hull, are subjected to alternate strains of tension and compression; and the tendency is to tear the ship asunder in the middle. That this does take place is evident from the fact that both wooden and iron vessels have been known to founder by giving way and breaking asunder. Circumstances may at any time arise when the danger from this source becomes greatly increased. The vessel may be cast ashore, and with the receding of the tide may be left suspended partially out of the water, and remain supported at only one or two points in her length, by ledges of rock. Such cases have occurred, and it has become doubtful whether our present construction of iron vessels enables them to withstand the shocks and impacts, to which in such a case they may be subjected.

This is not the first time I have applied myself to the inquiry, for the purpose of ascertaining, in the first place, what is the transverse strength of vessels as now constructed; and, next, whether the builders of iron ships have been guided in their construction by right principles, and have obtained the greatest strength with the smallest quantity of material. In pursuing this investigation, I have come to the conclusion that our present iron vessels are dangerously weak when exposed to strains of the kind I have indicated; and I believe that this defect of construction may be remedied by a more careful attention to correct principles of proportion, without in any great degree increasing the weight of the vessel.

To ascertain the strength of our present ships, I have supposed them to be placed in the extreme position of danger to which they are ever likely to be exposed; that is, supported at the centre of the vessel on some rock with the ends freely suspended. In this position an iron vessel is, in fact, a wrought-iron hollow girder, and we may apply the simple formula, $W = \frac{a\,d\,c}{l}$, by which we ascertain the strength of such constructions.

If we take vessels of the great length of which they are now made, we shall find that they are far too weak along the deck to resist the force of tension, to which, in the position we have assumed, that part is exposed. Taking as an example a vessel of 300 feet in length, built some years ago, I found that she would have given way with four-fifths of the actual displacement of herself and cargo. Taking a vessel constructed according to Lloyd's last rules, and registered A 1 for twelve years, I found her still inadequate to sustain the stress to which she would inevitably be exposed in such a position, the weak part being still the upper deck. I am therefore forced to the conclusion, that a large increase in the sectional area of iron in the upper part of the vessel should be adopted; and the plan I have proposed consists in the introduction of two rectangular and two triangular cells of wrought iron (similar in principle to those in the Britannia and Conway tubular bridges), placed longitudinally under the upper deck of the ship. Cells of this form would increase enormously the strength of that part, and might be adopted without any great modification of the other arrangements of the ship.

In the second place, I am led to recommend the substitution of the new system of chain riveting along the decks and upper and lower portions of the sheathing, in place of the present weak plan of double riveting. This change alone would secure an increase of 30 per cent. in the power to resist tension in those parts; and although there are practical difficulties in the way of its adoption, I believe these may, to a great extent, be overcome.

Now, in looking at the principles on which iron ships have been constructed, it will be found that sufficient attention has not been paid to proportioning every part to the strain it has to bear. As now constructed the iron is distributed almost uniformly throughout the length and uniformly throughout the depth of the vessel, and in this way much material is wasted. In constructions which have to resist transverse strains, economy can only be obtained by collecting the material towards the top and bottom in the transverse vertical section, and towards the centre in the longitudinal section. The longitudinal cells and stringers should be placed as near as possible to the upper deck or the keel, as the case may be, and they should be gradually reduced in thickness from the centre towards the ends of the vessel. With the exception of most of the sheathing plates and ribs, which may be left uniform, no more material should be expended upon the intermediate parts, approaching the neutral line, than is absolutely necessary.

With the adoption of this improved system of construction, and a closer adherence to sound

principles of design, I am of opinion that greater security may be obtained, and the fearful accidents which have so frequently occurred be greatly mitigated in severity, if not entirely prevented.

WALL BLOWN DOWN.

THE high wind on Monday last, blew down the greater part of the flank wall of a house in Islington, which was ready for the plate of the roof. It happened most fortunately when the men were away to dinner. The work was of a fair description, better than much which stands. Not half an hour previously, the district surveyor had pointed out, with reference to the corresponding wall of a house close by it, the weakness of lofty flank, or party walls, especially where they adjoin the opening left for the staircase. In a house of four stories, there is a wall perhaps 40 feet high, two stories of 14-inch work, and two stories of 9-inch, without any bond in it, and with nothing against the wall in its whole height to steady it. Such a wall, too, is often run up rapidly, and with inferior materials, so that the mortar even at the bottom is quite soft, and yielding. The wonder is not that walls in such a condition do now and then fall, but that any of them stand.

WAR APPLIANCES.

THE Armstrong strong arm is not to be left without a rival, although Sir William is confident that when his new cannon is expressly made for the long range, which, it seems, it has not yet been, it will outrival its formidable Whitworth rival. Meantime, like every one else, we may notify and record a few of the experiments recently made with the Whitworth rifle cannon, or cannon rifle. These experiments were made at Southport, before General Sir John Burgoyne and other officers. A three-pounder, loaded with eight ounces of powder, and set at an angle of 35 degrees, was pointed at a mark, which is said to have been far out of sight of the best telescopes; but how it was pointed at an invisible target is not explained: a mariner's compass, one would think, must have been requisite, if even that could have been exactly enough applied to the purpose in view,—or rather not in view. The projectile, it is stated, fell at a distance of 9,688 yards—more than 5½ miles—and only thirty-four yards to the right of the mark; and this deviation was thought to have arisen only from too great an allowance for the strong wind then blowing. At an elevation of 20 degrees the practice, it is said, was the most wonderful that has been witnessed with any artillery in the world. The first shot went four miles, and fell only four yards from the right line of the fire, and the greatest amount of divergence from the true line, at 7,000 yards range, was only 22½ yards. Fired at a regiment in square, or even a picket of a dozen men, every shot would have told! The vaunt engraven on the old gun at Dover,—

> "Load me well, and keep me clean,
> I'll carry a ball to Calais Green,"

will be no great promise soon it would appear.

Some pamphlets have been forwarded to us in reference to Turner's tents, which we think have been already noticed in the *Builder*. They seem to be a decided improvement on the old close and unsatisfactory field accommodations for our soldiers, which it is the purpose of these new patented tents to supersede. They are covered with Warne's patent mineralized fabrics, or other suitable waterproof material; and the bell tents are ventilated at the apex by a simple arrangement, which also insures safety in reference to fire, the tent-pole being an iron tube or flue connected with a compact and convenient stove of a simple pyramidal form. Fitted to the tent-pole are stays of galvanized wire cord, secured by lanyards to galvanized iron pegs of corkscrew form, screwed into the earth; and over these cords of course the waterproof covering is stretched.

ON THE APPLICATION OF HARMONIC ANGULAR PROPORTION TO GOTHIC ARCHITECTURE.

ATTEMPTS have been made at various times to rediscover the principles and proportions used by the architects of the Middle Ages throughout Europe. One of the most successful, and certainly the most popular of these attempts, is embodied in the rules laid down by Cesarianus in his "Commentary on Vitruvius" (1521). Upon these Mr. J. S. Hawkins, in 1813, founded the part of his interesting "History of the Origin and Establishment of Gothic Architecture," which treats of this branch of the subject. These rules purported to fix the various proportions of certain Mediæval churches by means of a kind of angular measurement produced by a system of equilateral triangles; and the plan and sections of the cathedral of Milan were given as illustrations. Nothing more, however, need be said concerning it than that though all the proportions of Milan Cathedral might have been determined by means of equilateral triangles, yet that church is by no means free from the charge of monotony; and the rules of Cesarianus would certainly not be comprehensive enough to account for the more varied and artistic proportions of the churches of the same era in France, Germany, and England.

The equilateral triangle, however, enters largely into, if it does not entirely control, all Mediæval proportions, particularly in the ground-plans. In Chartres Cathedral (the ground-plan of which will be found in the *Builder* of October 29th of last year), the apices of two equilateral triangles, whose common base is the internal length of the transept measured through the two western piers of the intersection, will give the interior length: one apex extending to the east end of the chevet within the aisles; the other to the original termination of the nave westward, and the present extent of the side aisles in that direction. With slight deviations, most, if not all the ground-plans of the French cathedrals are mensurable in this manner, and their choirs may be so measured almost without an exception. Troyes Cathedral is in exact proportion with that of Chartres; and the *choirs* of Rheims, Beauvais, St. Ouen at Rouen, and others, are equally so. Bourges Cathedral (which has no transept) is exactly three equilateral triangles in length inside, from the east end of the outer aisle to the eastern columns supporting the west towers. Most English cathedrals appear to have been constructed in their original plans upon similar rules. In many cases (as, for instance, at Amiens), it is easy to see the reason for deviating from the original symmetrical plan, but the discussion of this would be foreign to the immediate purpose of the present article.

There is an interesting paper on the above system of proportion, in C. R. Cockerell's memoir of William of Wykeham: Proceedings of the Archæological Institute, Winchester, 1835.*

Although the system of equiangular triangles will go far to fix the relative dimensions of many of the Mediæval buildings, yet it will soon be felt on applying it, that some more comprehensive method is wanted to enable us to account for, and systematize, the ever-varying yet always beautiful proportions of the grander Gothic edifices of Europe. The above, indeed, forms only part of a much higher system of harmonic proportion, of which it is the object of this paper to treat. This system is called by Mr. Hay, the "Harmonic Law of Nature," and it is as applicable to Mediæval buildings as it is to the Parthenon and the Temple of Theseus, to which Mr. Hay has successfully applied it, as mentioned more than once in the *Builder*.

This law has already been referred to in the *Builder* of May 14, 1859; but it will be necessary to recapitulate the practical part of what is there stated, before testing it by an existing example.

Mr. Hay's mode of constructing a series of harmonic rectangles is shown in Fig. 1, where ABDC is a square, and ACFE a rectangle, having its longest sides equal to the diagonal of ABDC. ACHG is a rectangle, having its longest sides equal to the diagonal of ACFE, and so on. The angles of the rectangles ACFE and ACKI have to be slightly altered or *tempered*, in order to bring them to a number of degrees having numerical proportions to the others; and this gives the following series:—

45° 36° 30° 27° 24° 22° 30′.

Completing the series by adding 40° (the angle of a rectangle erected on the base, and having its height equal to the vertical of an equilateral triangle, nearly), 33° 45′, and 25° 42′ 51″ (respectively $\frac{3}{4}$, $\frac{3}{5}$, and $\frac{2}{7}$ of a right angle), a series is obtained proportionate to the notes and intervals in the natural scale of C major, with the addition of B♭; and by doubling and bisecting this scale, thereby taking one octave below and one above it, a set of working scales is obtained, as thus:—

* Mr. W. P. Griffith's researches in this path are well known.—ED.

	C	D	E	F	G	A	B	H	C
I.	1	$\frac{8}{9}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{4}{7}$	$\frac{8}{15}$	$\frac{1}{2}$
	90°	80	72	67½	60	54	51⅜	48	45
II.	$\frac{1}{2}$	$\frac{4}{9}$	$\frac{2}{5}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{2}{7}$	$\frac{4}{15}$	$\frac{1}{4}$
	45°	40	36	33¾	30	27	25⅞	24	22½
III.	$\frac{1}{4}$	$\frac{2}{9}$	$\frac{1}{5}$	$\frac{3}{16}$	$\frac{1}{6}$	$\frac{3}{20}$	$\frac{1}{7}$	$\frac{2}{15}$	$\frac{1}{8}$
	22½°	20	18	16⅞	15	13½	12⅞	12	11¼

This series, with four additional octaves, has already been given in *The Builder*.

These angles, with their bisections and complements, will give almost every rectangle used in those Mediæval buildings on which care and thought were bestowed. All other rectangles appear to be either subordinate to, or inevitable from, some harmonic rectangles of greater importance, or to be derived from proportionably cut polygons.

Figs. 2 and 3 show the application of the above principles to a part of the ground-plan, and a cross section of the eastern part of the Temple Church.

Fig. 2 shows two bays of the choir; one-half contains the angles of construction, the other, the plan of the ribs and groins of the vaulting. The angle ABC is 60°, forming an equilateral triangle to the centre. The angle ADC is 90°, forming two squares of the side aisles. By reference to the other side of the plan, it will be seen that the vaulting ribs of the centre aisle intersect at an angle of 36° ($\frac{2}{5}$); those of the side aisles at an angle of 48° ($\frac{4}{15}$). The space between is the thickness of the columns, from which the spring of the vaulting ribs is measured.

Fig. 3 gives the principal angles of the cross section and the points from which they are measured. For the sake of simplicity many have been omitted, as also the east window, the dimensions of which also appear to be fixed by the application of the same principles.

It is to be noticed that the line AB is somewhat above the present level of the floor. It is believed that AB was the original level of the interior of the choir. In the proceedings of the Oxford Society for promoting the study of Gothic Architecture, for Easter and Trinity terms 1845, it is stated that "in the recent restorations of the Temple Church in London, by lowering the level of the floor of the church more than a foot, and leaving the bases of the pillars that much above the present floor (casing the part below with marble to correspond with the rest), they are made to appear stilted," &c. In old drawings of the Temple Church, the bases are *not* shown stilted, and it seems probable that they were not so originally. They are *not* so in the Lady Chapel at Salisbury, which, in some respects, resembles the choir of the Temple Church.

It will now only be necessary to refer to the angles laid down in Fig. 3, to show the application of the harmonic angular principle to this most exquisitely proportioned church. The rectangle of the whole section has its angle, BAC, 30° ($\frac{1}{3}$); the angle, BED, which fixes the height of the columns, is 40° ($\frac{4}{9}$); BEG, which extends to the top of the opening of the side windows, 36° ($\frac{2}{5}$); BEH, extending to the bottom of the side window opening, 12° ($\frac{4}{15}$); BEI, 10° ($\frac{1}{9}$); KLM fixing the point of springing of the side window arches, 5° ($\frac{1}{18}$); the angle at P, fixing the thickness of wall and buttress, makes an angle of 18° ($\frac{1}{5}$), with a perpendicular from P (though this angle is correct its originality appears doubtful); BVF, 50°, or the complement of FVS, 40° ($\frac{4}{9}$); and the angles at O and T, being the angles of the arch sections of the centre and side aisles, 68½ (not harmonic), and 54° ($\frac{3}{5}$). With regard to the angle O of the centre aisle arch section, its want of proportion appears to have arisen from a desire to have the arch sections of the centre and side aisles of the same radius; and it is evident that the angle of the arch section of the side aisles must have been determined *first*. The two angles at P are doubtful by reason of the alterations that have taken place at various times—in both buttresses and roof, in the course of the numerous restorations; and from the gradual raising of the ground level outside having concealed the original base mouldings. Probably the angle of the centre roof was originally 60° or 63°.

Enough is here shown to prove the accuracy of the harmonic theory in its application to one of the most beautiful edifices of its age, and on which it is evident great care and thought were bestowed. If its dimensions were determined by any other principle, it is plain that it could not have been that of proportion of *lines*, for there is scarcely one harmonious combination to be found by those means. It is almost impossible that any two distinct systems could so exactly coincide, the greatest discrepancy between the angular and

HARMONIC ANGULAR PROPORTION AND GOTHIC ARCHITECTURE.

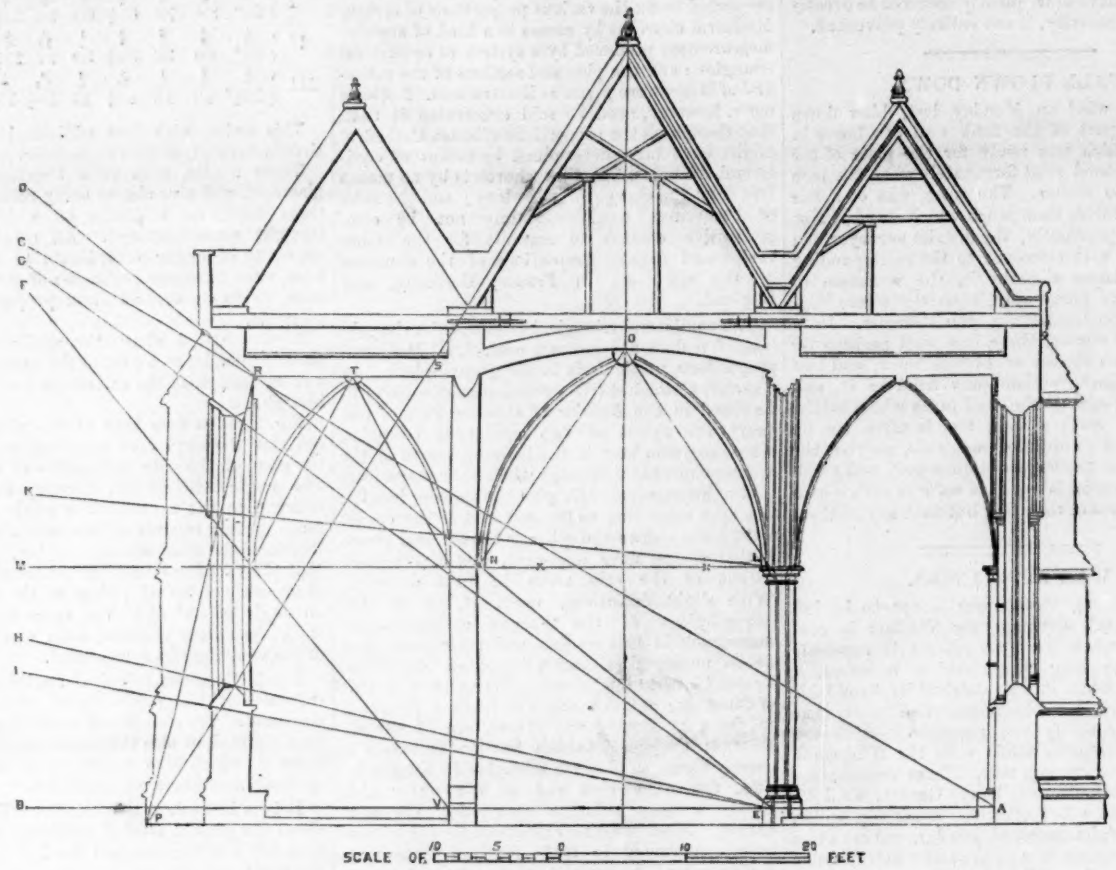


Fig. 3. Section of the Temple Church, London.

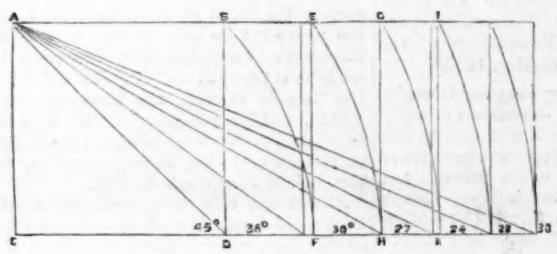


Fig. 1.

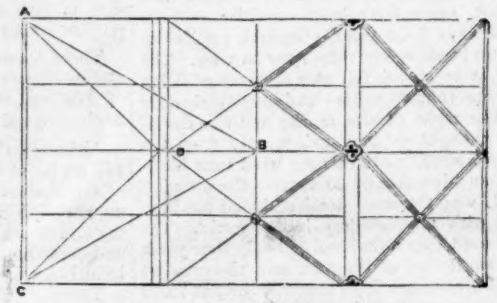


Fig. 2.

actual measurements not exceeding 3 or 4 inches, save in the instances pointed out, being less than those found by Mr. Hay in the Parthenon and Temple of Theseus. It would be easy to show that the whole building is governed by the same principles in the proportions of its longitudinal section, and of the circular portion, the latter being founded on a symmetrical plan; but a full development of their application would require many diagrams, and a pamphlet, if not a volume.

But though the harmonic law is so beautifully developed *here*, it is not from *this* building alone that its principles are to be rediscovered. Every application of it to our cathedrals, and more carefully erected buildings, shows plainly how much harmonic angular proportion must have been studied by those who planned them.* The rules, indeed, were so simple, that they could have been easily learned, and applied by the rudest masons, and such seems to have been the case; the results being, the production of beautiful proportions before which the rules of Palladio and the Renaissance school shrink into insignificance. It is to be hoped that the time will soon arrive, when no architect will allow his designs to be "written in stone" without first carefully testing them by some such principles as those shown in the above simple harmonic law; the proper use of which,—to curb and chasten, not to fetter, or clog genius and invention,—can be traced alike in the polished marbles of ancient Greece, and in the coarser stones of Mediæval France and England. J. E. I.

* Of this, the choir of Lincoln Cathedral is an exquisite illustration.

STANLEY FARM, NEAR BRISTOL.

STANLEY FARM consists of about eighty-four acres, the property of Thomas Proctor, esq., and is worked in connection with Walls' Court Farm adjoining. Of the latter, provided with railway, water supply, school for children, and other appliances, we have given a description, views, and plan in a previous volume.* Since these were published very considerable additions and improvements have been made.

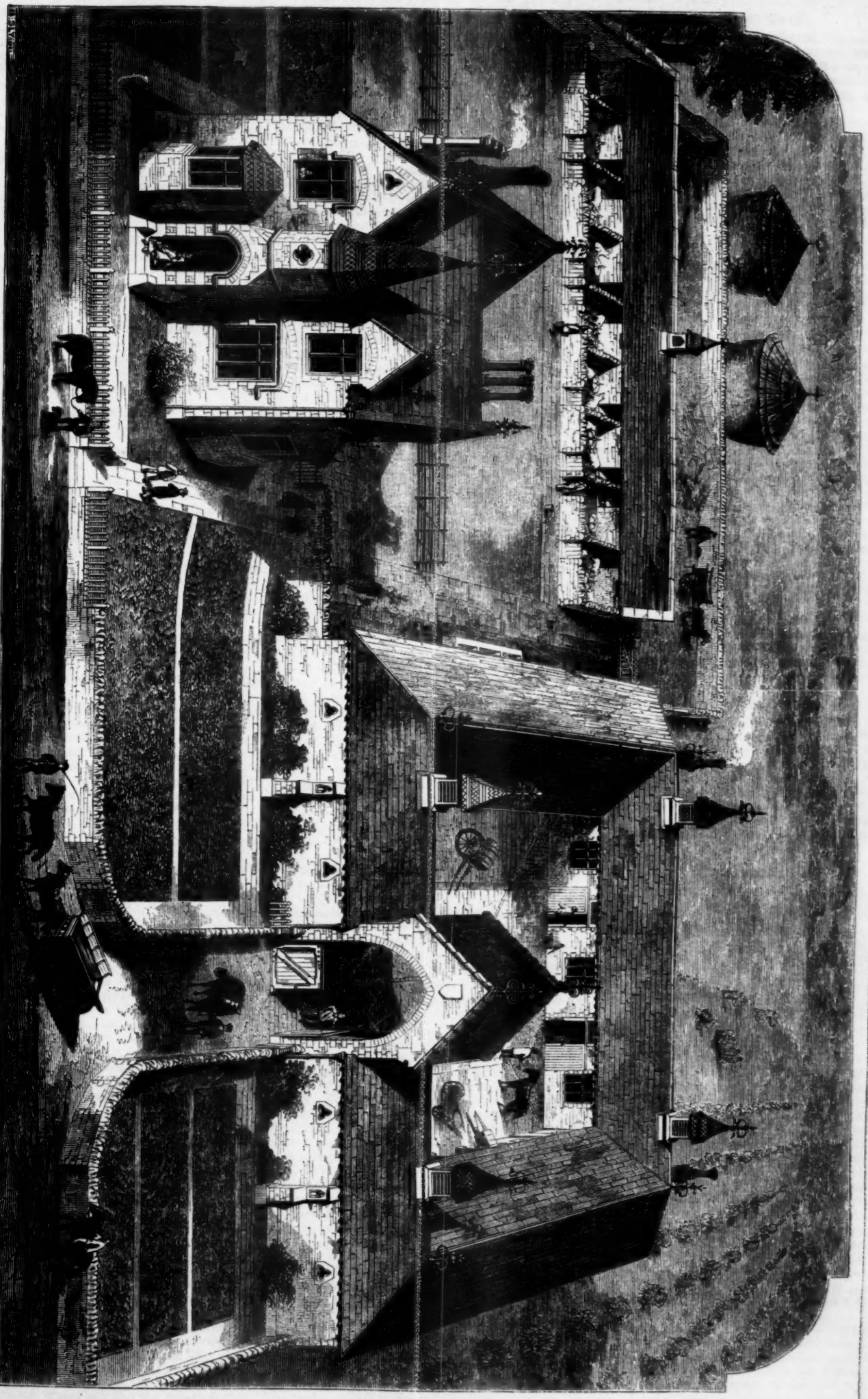
The house on Stanley Farm, shown in our present view, is occupied by the bailiff; and the buildings erected near it are used as stables, and sheds for carts, waggons, and agricultural implements. There is also a piggery.

The cattle-sheds at Walls' Court are conveniently situated for the grass land, and Mr. Proctor's residence is near them. The buildings now shown are about 700 yards from the cattle-sheds, conveniently situated for the arable land; and the proximity of the bailiff's residence gives the opportunity for proper supervision of the horses on the farm. In forming an opinion as to the capabilities of the buildings at Walls' Court, the two views must therefore be taken together. According to the present experience of Mr. Proctor, he finds it work well thus to divide the views with reference to the requirements of the farm, rather than concentrate them all on one spot.

Some years ago, when draining and improving the grass land, Mr. Proctor thought it desirable to endeavour to ascertain how far improvement was to be attributed to each operation, and he therefore left some fields undrained which he manured in exactly the same way as those drained, and he also left drained and undrained land without manure. He found that, although the quality of the grass was improved by drainage, to obtain a fair return for this cost, it was necessary to apply manure at a liberal rate on the drained land, as the quantity and quality of the grass on the unmanured drained land was not in the same proportion to the outlay as on that which was drained and manured. On that which was manured but not drained, he found the quantity and quality of the grass improved; but the vegetation on the undrained was from ten days to a fortnight later in the spring, and gave out from ten days to a fortnight earlier in the autumn, thus giving nearly a month's longer growth in the season on the drained land, and that at two very important periods of the year.

Drainage in other respects is of the utmost importance. We may add, from Mr. Proctor, that his buildings and arrangements are open to any of his brother farmers who may desire to see them: they are at full liberty, he writes, to take admeasurements, and may have any information concerning them that they may desire. Mr. Proctor has strong notions on the value of interchange and experiences, and no faith in concealment. He wisely believes in the proverb,—"There is that scattereth, and yet increaseth; and there is that withholdeth more than is meet, but it tendeth to poverty."

* See vol. XIII. p. 340, and p. 367 (July and August, 1855).



STANLEY FARM, NEAR BRISTOL, THE PROPERTY OF MR. ALDERMAN PROCTOR.—MR. GODWIN, ARCHITECT.

LONDON BORES.

NEVER, in the memory of that celebrated individual, "the oldest inhabitant," were the streets and thoroughfares of the metropolis so much disturbed as they have been recently. In all directions bands of workmen are busy as moles burrowing the earth, each in his way, advancing the great drainage works; and now operations have been commenced for making the underground of London available for railway purposes, and soon below the crowded streets the locomotive whistle will sound and trains roll rapidly along. The squares north of Hyde-park are blockaded, and poor ladies look out of their windows aghast, and postpone intended "parties."

In the neighbourhood of King's-cross extensive works are in progress for the purpose of diverting the sewerage from the middle of the road to new sewers,—one under each of the foot-paths,—so that the centre may be left clear for the City railway tunnel. Deep diggings are also going forward in the York-road (Maiden-lane). We have watched with care the openings which have been made in this neighbourhood, in consequence of the tradition that Battle-bridge was the site of a great conflict between Alfred and the Danes. The soil has been turned up in all directions, and yet not a relic, so far as we can learn, has been discovered.

PROFESSIONAL EXAMINATIONS.

SOME of our readers will be glad to hear that the council of the Royal Institute of British Architects have appointed a committee to consider as to the propriety of affording to members and intending members of the Institute facilities for passing a voluntary professional examination, of which certificates should be given. The Committee have already held one meeting, numerously attended, at which some important resolutions were passed, and are about to meet again.

THE ARCHITECTURAL ASSOCIATION.

THE ordinary meeting of the Association was held on Friday, the 17th of February, at the house in Conduit-street.

The chair was taken by Mr. Penfold, the president.

Mr. T. Blashill read an abstract, containing the principal views advanced by him in the paper read at the previous meeting, on the application of iron-work to architecture. In the course of his observations he exhibited specimens of iron in its various stages, and described the processes through which it passes from its native state, until manufactured into wrought iron and steel.

The Chairman said he was convinced of the importance of the subject in connection with their profession, though he differed from the writer in a few of his conclusions. According to Mr. Blashill, if the Greeks had been initiated into the properties of iron, they would have thought the Parthenon a lamentable affair. The suggestion of introducing iron instead of brickwork into the façades of our street buildings was especially valuable. The writer considered it wrong to adopt curves in cast iron, or straight lines in wrought iron, and that there was abundant room in the same building for both materials. In connection with his observation on the introduction of iron into fireproof flooring, the chairman added that whoever could suggest a cheap system of such floors would benefit society.

Mr. Roger Smith considered the suggestion as to introducing iron into shop fronts peculiarly valuable. No doubt practical difficulties would present themselves to such application of the metal, but these were incident to every novelty, and by study and experience would be overcome. If we began with iron in the basement story, we should not turn therefrom to the heavier material as we went up. He (Mr. Smith) thought that the timber houses still to be seen in parts of Great Britain and France would be a good guide to us in the design of an iron front, as the material of which they were built was the same from bottom to top. In his opinion, Mr. Blashill hardly spoke of ancient examples as they deserved. To have recourse to nature alone as our guide would lead us to absurdities. We could not now-a-days give up our books, and retire into the woods to study architecture. We must learn in bricks and mortar what had been done already; though we need not despise nature, and thus run into the other extreme. He wished to mention some remarkable instances of ironwork which the present day had produced. There was first the Crystal Palace, as it originally stood in Hyde-park. At the suggestion of Sir C. Fox, it was built on squares of a fixed dimension—as few as possible. By this plan any column could be set up at once, and any girder upon it, without the trouble of searching for the fitting-place of each. To bring about this certainty and facility in the erection, Sir C. Fox made all the drawings with his own hand, working sixteen hours a day for several weeks without intermission. Then there was the Great Western Railway Terminus, at Paddington; the dome of the British Museum Library; the roof of the new Covent-garden Theatre (a description of which had been given by its architect, Mr. Barry, to the members of the Institute of British Architects, and who had solved therein the problem of making fireproof roofs); and the roof over the courtyard of the new Museum at Oxford. He admired, especially, the imitations of foliage which had been inserted in the latter. He showed as specimens of this introduction of ironwork, drawings of fanlights over the doors, ventilators in the ceiling, and spandrils in the roof which had been adopted in the design of a public hall at Maldon. These were cast at Messrs. Baker's Works, Falkirk, from the designs which he had furnished. These decorations corresponded to fretted work in wood; but had the advantage of finer lines, as cast patterns in iron were sharper than in any other material. Besides, a single design and repetition would afford the groundwork for any number of castings, and thereby the most skilful labour would be saved, namely, that of the designer and of the pattern-cutter.

Mr. Lewes observed that the principal objection in his opinion, to iron work when partly covered, and partly exposed to the air, was liable to rust. This difficulty did not arise in the case of fire-proof floors, as no part of the iron was exposed, but would present itself in roofing. As was seen in the case of the Houses of Parliament, painting or galvanizing would not afford a sufficient protection, for the slightest defect in the coat, even a pin-hole, being uncovered, would admit the rust. The metal nickel, mixed with iron in certain proportions, would prevent rust, and prove superior to painting or galvanizing.

Mr. R. Smith exhibited some interesting photographic sketches, to show how ironwork could be adapted to architecture. Three of them represented views taken in Venice, one of them a building in Constantinople, and one a sketch from Florence. He might also refer to Mr. D. Wyatt's work for the same purpose.

The Chairman produced sketches, showing specimens of designs in iron of the seventeenth and eighteenth centuries, and observed that the gates to Queen Anne's Walk, in Hampton Palace, were very fine examples of the excellence to which wrought-iron could be brought. The apparent difficulty arising from the expansion and contraction of metals, under the influences of heat and cold, might, he thought, be got over in the same way as the same influences were counteracted in rails by fishing them.

Mr. Blashill, in reply to the several observations, said neither nature nor any of the styles should be imitated; all styles copied their predecessors, but not entirely; they rather improved on them, as the Greeks did on the Egyptians. To show the folly of taking types, he begged to instance the drinking-fountains, which, as novelties in connection with their profession, might be expected to have elicited appropriated designs. And yet he would say that there was not a fountain of suitable design in London. The general design introduced was that of a shell looking out of a window, and no one seemed to rise further than the bivalve window. This afforded a proof that designers were trammelled by the study of the antique and the Mediæval. As regarded the strength of cast-iron, there was greater danger of breaking it when made into patterns than when it was in the solid piece. The joints of the pattern would be the weakest part, as in the case of a beam let into a wall, which was less capable of resisting force at the part let in. In wrought-iron, on the contrary, the whole strength was brought into play in resisting the blow. He deprecated the folly of designing down to the ignorance of people who had no scientific knowledge.

Votes of thanks were passed to Mr. Blashill and Mr. Smith, and the meeting separated.

ARTIFICIAL STONE.—Messrs. Pavin de Lafarge, Viviers, Ardèche, propose to employ a compound of quartz and clay as a substitute for sandstone. The dry portion of the compound is finely-powdered quartz, and the wet of aluminous earth. The mixture is cast in moulds, and then subjected to the necessary pressure.

GLASGOW ARCHITECTURAL SOCIETY.

THE WALLACE MONUMENT.

A PROTEST, it may be remembered, was made in our columns against the award of the committee in this competition, on account of a departure, in the successful design, from the conditions of the committee itself, as to colouring the drawings.

At a meeting of the Glasgow Architectural Society, on Monday evening, the 20th February, Mr. Thomas Gildard, architect, moved—"That the Glasgow Architectural Society views with, and hereby expresses its, extreme surprise, regret, and indignation at the recent adjudication on the competition designs for the Wallace monument, intended to be erected on the Abbey Craig, Stirling."

Mr. Gildard spoke at considerable length in support of his motion, chiefly dwelling on the fact that, while the advertisement mentioned that the plans and elevations must be tinted in Indian ink only, and no coloured drawing be received; notwithstanding this, seven coloured drawings were received, and to one of these seven the first premium was actually awarded by a large majority of the committee. "The competition system," said Mr. Gildard, at the close of his remarks, "has been long in corruption; but we, as a corporation, have surely something in our power to both stay the progress and restore it to its pristine health and influence; and towards this, I think it chiefly attaches to us to denounce every instance in which we find have been disregarded the common principles of moral rectitude. Let us, as an Architectural Society, show a bold and united front to all mal-practices in competitions, and very speedily committees wishing designs will be unable to afford to injure and insult us, and competitors will be found, as at least respects instructions, working more harmoniously."

Mr. Gildard's motion was seconded by Mr. Alexander Watt, architect, who also spoke at some length.

The motion was carried unanimously.

Mr. Gregory, Mr. Burnet, and others, remarked that they understood that the drawing of the successful competitor had been coloured by the artist in Edinburgh, without the competitor's knowledge or authority.

Mr. Baird moved, seconded by Mr. George Thomson—"That the remarks by Mr. Gildard, in introducing his motion, should be adopted as the expression of the mind of the society; and, to attain one of the objects for which such a society has been instituted, he hoped that the press of Glasgow and Edinburgh, and those publications throughout the kingdom more particularly devoted to the interests of architecture, would publish them *in extenso*, the subject being one of national importance." This also was agreed to.

THE SHEFFIELD SCHOOL OF ART.

THE annual conversazione of this school has just been held, Mr. Redgrave in the chair. The meeting was a good one. An extensive and varied collection of works of art on the walls formed the fourth annual exhibition of the School. Mr. Redgrave addressed the meeting at considerable length, and is fully reported in the *Sheffield Independent* of 25th ult. In allusion to British constructive skill and French taste in art, he said:—"Mr. Sheepshanks, who has done so much for art, on the occasion of the Exhibition of 1855, gave an order for several pieces of furniture to be made for exhibition at Paris. I have seen the Frenchmen taking the drawers out of them, with perfect wonder at the ease with which they worked, holding up their hands in astonishment to think that such marvels of workmanship should be there from England. But they looked with equal astonishment at the absence of any display of taste in them. Whereas the French goods, though beautiful in ornamentation, are badly finished, and you might be pulling at a drawer for half an hour before you could get it out. The people, however, will take those works without utility, rather than those devoid of beauty. But as soon as the Frenchmen get the English tools, it will be found that they can make their articles beautiful, and at the same time as good as your mere fabrics, and they will be in London supplanting you."

After the prizes were distributed, Mr. Young Mitchell, the head master of the Sheffield School, remarked that, for each national medallion gained by the pupils, the school received from the Department the value of ten guineas in works of art. The School had already received these advantages to the extent of 150 guineas in the shape of rare electro-types and photographs of the cartoons of

Raffaelle, &c. The present awards would entitle them to further contributions.

The School, upon this occasion, had twenty-nine out of the maximum number (thirty) of medals that could be awarded to any one school at one distribution.

FOREIGN RAILWAY WORKS.

THE important works for the enlarging of the Paris terminus of the Chemin de Fer du Nord are to be commenced at the end of February. The land has been valued, the plans completed and approved of, and all formalities gone through.

Many branches of the Pyrennean railway group are being already surveyed, especially between Bayonne and Pau, and from Pau to Bagnères de Bigorre. The inhabitants of the localities to be benefited by them are in anxious expectation of their being commenced.

The Minister of Public Works announces for 1860 and 1861 the opening of 450 kilomètres of railways in France. These are Astricourt to Lillers; Aillevers to Favernay; Nouzon to the Belgian frontier; then follow the branch lines of Coulommiers, Bar-sur-Seine, Rennes to Redon and Montauban, Saint-Lô, Saint-Christophe to Rodez, Monet to Montargis, and Burgundy to Beaumont. In two years the Paris and Nevers line, a direct railway to Lyons, will be probably opened for traffic.

In a few years hence we shall have the two banks of the Rhine placed in direct communication on no less than six points between Waldshut and Cologne. Two permanent bridges, our readers are aware, have been already constructed and opened for thoroughfare; that of Waldshut, between Switzerland and the grand duchy of Baden, and that of Cologne. The Kehl bridge is in a fair way of construction, and will be open in a year. Two others are proposed between Mayence and Coblentz. The drawings have been got out and negotiations are on foot between the governments on each side the river and the different railway companies interested in their construction. As soon as some questions are settled, the works will be commenced. The sixth bridge is one that the Grand Duke of Baden has recently declared to be of paramount importance, viz., over the Rhine at Manheim, and he has urged the necessity so forcibly that the project may be looked upon as decided.

In 1856 the concession of the Florence and Arezzo Railway was accorded to the Marquis de Flers, but the works were never terminated. The Tuscan Government has now issued a decree annulling the original concession, and ordering that the works be continued at the expense of the state.

GOTHIC ARCHITECTURE IN AUSTRIA.

THROUGH Herr Reichensperger's correspondence with the *Ecclesiologist*, we are from time to time informed of the architectural news from Cologne and the north of Germany. Being now in the south for the purpose of observing the advancement of the arts, perhaps a few lines may not be uninteresting to your readers. Having lately made the acquaintance of Herr Ferstel, I have had much opportunity of closely inspecting modern buildings. He has in hand, and nearly finished, the New Exchange and Bank Buildings, Vienna, a work of very high merit. In style it is difficult to describe, but by giving you some idea of this gentleman, you may conceive, perhaps, his last work. He is a great lover of Gothic, and gained the prize in the competition for the Votive Church, now being erected here outside the Schottenthor. Well, his design for this Exchange is, in motive, Gothic: the carving and general idea are Gothic; but the arches are round, and there are many Classic ideas in the building, particularly the pillars. The metal-work is very Gothic: the lamp-brackets, door-handles, &c., are cast in bronze, and very chaste in design: the gates are pressed and wrought. There is a great use of imitation stucco, marble, and Portland cement, designed in the style of the Italian very Early Gothic marble mosaic. In this manner many of the halls are decorated, and the effect is most charming. This seems to be a most legitimate ornamentation, as it is not a sham.

The Bank direction-room is very elegant, and the furniture admirable; patterns flat and inclined towards Gothic: the wood carving (only so far conventionalized as to be in good taste and according to decorative principles) is the finest and most life-like I have ever seen; and the polychromatic decoration is very elegant. Above the wainscot the wall is covered with pressed leather, diapers of which are very chaste, and much colour and gold is used on this leather: the effect is excellent. The chairs are also of pressed leather, with gilded and coloured patterns.

Herr Ferstel's new church is a cathedral-like building, about 300 feet long, somewhat after Cologne in idea, and perhaps too German and liny for our taste, but still a noble work, and particularly as German Gothic architecture.

I think the future of Gothic domestic architecture is very hopeful and bright in Vienna; and in the next ten years I anticipate many fine buildings. Herr Ferstel has a thorough knowledge of what is required in modern domestic Gothic. Herr Schmidt, who gained the prize for the Berlin Town-hall (which of course was *not* executed!), is a Goth, and is now professor in the Academy, and is a perfect master of his craft. Herr Ernst is now restoring St. Stephen's, but not at all according to our ideas: dreadful Vandalism, and no Conservatism, although the modern work is not bad at all. Of course Herr Ferstel has to feel his way here, and begins with round arches, &c. He is intent, however, on working in true architecture by degrees. As to Munich Gothic, it is ludicrous, Maximilian-street having become a proverb.

Vienna. W. TAYLOR.

THE LATE W. H. PLAYFAIR, ARCHITECT.

ARCHITECTURAL INSTITUTE OF SCOTLAND.

AT a recent meeting of the Architectural Institute of Scotland, held in George-street-hall, Mr. J. Murray Graham, of Murray's Hall, read "A Notice of the Life and Works of the late William H. Playfair, Architect." The paper was illustrated by Mr. Playfair's own drawings of the most important works executed by him. The following abstract of the paper has reached us:—Mr. Playfair was born in 1789 in London, where his father, also an architect, carried on business. He came to Edinburgh at the age of fifteen, and for some time attended the classes of his uncle, Professor John Playfair. His architectural teacher was William Stark, of whom Sir Walter Scott had so favourable an opinion that he got from him the first design for his house at Abbotsford. When, in 1816, a Parliamentary commission was appointed to decide upon plans for the repair and removal of the Edinburgh University Buildings, Playfair's plans obtained the first prize, of 100 guineas, and, with some slight modifications, his plans were carried into execution. The interior front of the buildings facing the quadrangle were universally admitted to furnish an excellent specimen of Italian architecture. In 1818 he supplied plans for the Astronomical Observatory on the Calton-hill, and for Dollar Academy, both in the Roman style of architecture. In 1819 he furnished an elaborate design for the Advocates' Library, with a colonnaded portico fronting George IV.'s bridge, on a much grander scale than was afterwards carried out. In the same year he designed the gateway and lodge for Heriot's Hospital, which is in admirable keeping with the main structure. In 1820 Mr. Playfair was employed by the magistrates and proprietors to plan various crescents and streets for the side of the Calton-hill and among other designs now filled up, were the Regent, Royal, and Carleton terraces, Brunswick-street, Hillside-crescent, Windsor-street, as well as the Royal Circus on the north side of the city. His reputation as an architect was now considerably raised, and in 1822 he was employed to furnish the designs for the Royal Institution buildings on the Mound. After describing the architectural features of this structure, Mr. Murray Graham said, as a whole, it was deficient in effect, and that chiefly on account of its position. The style of the Grecian temple required that the building should be placed upon a height, and in all the ancient specimens this condition was observed. In 1826 Playfair took part in furnishing the designs for the national monument, in the style of the Greek Parthenon, and also for St. Stephen's Church. Mr. Graham next remarked upon his domestic buildings in the Italian style, illustrated by Dumphail House, in Morayshire, the late Lord Mackenzie's house at Belmont (now the property of Mr. J. Hope, D.K.S.), and Drum banagh House, Armagh; and those in the Scotch baronial style, which he had either wholly built, or materially added to—such as Banmore, Prestongrange, Craigcrook, Bonaly, and Islay House. One of his best strictly classical works was the College of Surgeons' Hall in Edinburgh, which, without being a mere copy of any ancient example, displayed in its front elevation the genuine air and spirit of Greek. His Calton-hill monuments to Professor Dugald Stewart and Professor Playfair deserved a word of commendation. The first, following, though not closely, a Greek model, was effective and beautiful, and was finely placed on the edge of the rock; while the second was a good example of the severe classical style, and was monumental in its character. After a brief notice of Lurgan House, and the Mansion of the Duke of Roxburghe at Fleurs, designed by Playfair in the Tudor style, and the latter of which especially was very successful, Mr. Murray Graham referred to Donaldson's Hospital, which was his largest work in this style, and had gained for him a most extensive reputation. His only Gothic buildings were Minto Chapel, and the Free Church College in Edinburgh. The National Scottish Gallery, designed in 1850, was his last important work. Mr. Playfair's life, apart from his professional engagements, was not an eventful one, and he died in 1857 at the age of 68. He was an architect of consummate knowledge and taste, rather than of original genius. He kept within the rules of his art, and was most laborious and conscientious in his attention to correctness of detail.

A SUGGESTION AS TO THE WESTMINSTER BELL.

AFTER the meeting of the Institution of Civil Engineers, on January 17th, Mr. S. A. Varley exhibited a cracked bell, the metallic continuity of which had been restored, by simply soldering the crack with tin, so that the bell rang as perfectly as before it was injured. It was explained, that tin had the property, when heated above its melting point, to nearly a red-heat, of rapidly dissolving copper. If, therefore, the cracked bell, after being soldered, was kept at a dull red-heat, or nearly so, for a little time, the crack would become filled up with an alloy of tin and copper, of nearly the same kind of composition as the bell itself, and in absolute metallic union with it, and quite as brittle and as sonorous as the other portions of the bell.

DESIRED EMBANKMENT OF THE THAMES.

ON Monday morning a deputation from the vestry of St. Luke's, Chelsea, waited by appointment upon the Right Hon. W. Cowper, at the Office of Works, Whitehall-place, to urge upon Government the equity of spending the money (38,150*l.*) now in their hands, and voted by Parliament for that purpose, in continuing the embankment from Chelsea Hospital towards Battersea-bridge.

Mr. Tite, M.P., stated the case of the parish. He observed, that under an Act of Parliament, passed in 1846, the sum of 145,000*l.* had been voted for carrying out the embankment and road, the whole of which had been expended with the exception of the balance above stated. The powers of the Act, though renewed by a subsequent one, had ceased, and the object of the deputation was to induce the Government to recommend the revival of the parliamentary powers to acquire the necessary property to continue the embankment which now ended at Chelsea Hospital on to Cheyne-walk, and so to Battersea-bridge. The total expense was estimated at between 60,000*l.* and 70,000*l.*; but if the Government would authorise the appropriation at once of the 38,000*l.* balance from the former votes, the parish suggested that the remainder might be spread over a series of years.

Mr. Byng, M.P., the Rev. Mr. Burgess, the rector of the parish, and several members of the vestry, represented the importance of the improvement in a public sense.

Mr. Cowper fully admitted the importance, both in a public and local sense, of the proposed embankment. The misfortune was that the 38,000*l.* referred to, not having been claimed within three years from the time specified, had gone back under a general rule into the Exchequer, and was treated as a saving, so that if anything was to be done Parliament would have to vote the money over again. In the present state of the public finances, he thought very strong and cogent grounds would be required to induce the House of Commons to pass such a vote. He assured the deputation of his entire sympathy with the object they had in view, and promised to represent their wishes to the Government, but he could hold out no hope of their accomplishment under present circumstances.

Members of the Chelsea vestry had another interview with the Chief Commissioner of her Majesty's Works on Thursday, March 1st, with reference to the bad condition of the new road leading from Lower Sloane-street to Chelsea Suspension-bridge.

IRELAND.

ADDITIONS and alterations are to be made at Enniskillen court-house, according to plans by the County Surveyor; the expenditure not to exceed 2,500*l.*

A new minor model school is to be built at Monaghan, by the Board of Public Works.

The Bagenalstown and Wexford Railway Company have received tenders for 20,000 sleepers of larch or foreign timber.

A trial will take place this term in the Dublin Law Courts, relative to the fall of house in Grafton-street (Kempston *v.* Butler, as already noted in the *Builder*); and some interest will be occasioned by the following cases, likewise announced to come off, *viz.*,—Lord Gough *v.* Carmichael: breach of duty as an architect; Hugh Kelly *v.* Crampton: payment for work and labour as a builder; Bolton *v.* Tyrrell: ditto; Burke *v.* Carroll: damage to adjoining premises during building operations.

The county surveyors have had an interview with the lord lieutenant, relative to their memorial previously alluded to by us; and his Excellency, having acquainted himself with the detail of their alleged grievances, promised that the memorial should receive favourable consideration.

Numerous gentlemen of commercial status have requested the corporation to withdraw the proposed bill for the new water supply, until the citizens should have ample opportunity to study it, and form an opinion upon its features. It appears to be not unlikely that even at the eleventh hour an amicable and mutually satisfactory arrangement may be made with the Canal Companies, for the supply.

It is proposed to erect a new music-hall of spacious dimensions, at Derry. Subscriptions to the amount of several hundreds of pounds have already come in.

A new church, for Roman Catholic worship, has been erected at Gargary Dolly's Brae, after designs by Mr. W. J. Barre, of Belfast and Newry, architect. Another, for same purpose, is being built at Courtnacuddy, and Lord Carew has subscribed 100*l.*, and given a free site.

New convents are to be built at Mountinellick (J. S. Butler, architect), also at Upper Glanmire-road, Cork; and others are in progress at Roscommon and Sligo.

An asylum for twenty-six widows has been completed at New-street, Dublin, at the sole expense of Alderman and ex-Lord Mayor Atkinson, after plans by Mr. Joseph Maguire, architect. Mr. S. H. Bolton, the builder. Cost, about 1,000*l.*

The new station at Ballybay, on the Dundalk and Enniskillen railway, is a Gothic building, presenting a frontage of 85 feet, and cost 1,700*l.* Mr. W. J. Murray is the architect; Mr. John Nolan, the builder. The company are about constructing the line from Cloves to Cavan. Mr. James Barton, C.E.

CHURCH-BUILDING NEWS.

Castle Rising (*Norfolk*).—A commencement has been made to rebuild the south transept and aisle of the church of Castle Rising. Mr. G. E. Street, is the architect; and Mr. Wm. Brown, of Lynn, the builder.

Saffron Walden (*Essex*).—The church here is to undergo an extensive reparation under Mr. Hussey, of London, by Mr. William Brown, of Lynn.

Cambridge.—For rebuilding All Saints' Church on a new site, about 3,000*l.* have been already promised towards the 5,000*l.* that are wanted. It is intended, says the *Chronicle*, to employ an architect of undoubted reputation, so as to have a church built in the true principles of Gothic art.

Northampton.—The committee for the restoration and enlargement of St. Sepulchre's Church, Northampton, have resolved to proceed in the carrying out of the plans prepared by Mr. Scott. There were seven tenders received, viz., from Messrs. Myers, Parker, Whitmy, Ireson, Jackson & Co., and W. M. Cooper, of Derby, the last of which, being the lowest, was accepted. The work has been divided into three sections, the first one of which only it is intended to proceed with at present, the funds already promised and collected being only sufficient for that purpose. The committee have, however, reserved to themselves the option of accepting Mr. Cooper's tender for the remainder of the work, at any time during the progress of the first section. To carry out the complete design, an additional 3,000*l.* will be required.

Islip (*Oxford*).—Of the Islip Church bells, the *Oxford Journal* says,—Two of them were cracked and sent forth what might be called "fractos sonitos." The operation (performed on one of them) of cutting out the crack was by no means effective in restoring harmony of tone. In August, 1859, a generous offer was made by John Parsons, esq., of Oxford, to defray the expense of recasting the whole set. The offer was at once gratefully welcomed by the rector, churchwardens, and parish at large. The work was entrusted to Mr. Alfred White, of Besselsleigh. The five old bells were taken by rail to Mr. Mears's foundry, Whitechapel, and successfully re-cast into six, sent down to Mr. White, at Besselsleigh, for fitting and arrangement, previous to being re-erected, and brought back again to Islip on January 22nd, of this present year. The arrival being expected by the inhabitants, a large assemblage spontaneously went to welcome the bells. They were played into the village by the Islip band, the rector, churchwardens, and others walking in a kind of extempore procession into the churchyard and up to the foot of the old church tower, where the rector read aloud the new inscription on the tenor bell, and delivered a short address, after which the work of raising the bells immediately commenced. Not the smallest accident occurred during the whole business.

Brighton.—It is in contemplation to erect a new church on a site in Victoria-road, in the west of Brighton. The architect is Mr. G. F. Bodley, of London. The style is to be Gothic.

Cosham.—A vestry meeting was recently held in the parish of Wymering, for the purpose of accepting the sum of 1,200*l.*, left by the will of the late patron of the living, Mr. F. J. Nugee, towards restoring the parish church. The plans, executed by Mr. Street, were submitted to the meeting. The fund was thankfully accepted, and the plans adopted.

Amesbury.—The new burial-ground and mortuary chapel here, provided by Sir Edmund Antrobus, has been consecrated. The new ground is conveniently situated, and is enclosed by a wall. The chapel is constructed of red brick and mud (according to a *Wilts* paper), and the entrance is surmounted by a bell-turret. The interior is paved with Minton's and Peak's tiles: the seats and roofs are of stained deal. Mr. Butterfield, of London, was the architect; and the works, which have cost about 1,000*l.*, have been carried out by Mr. Edward Andrews, builder.

Chetnole.—The small church of Chetnole, according to the *Sherborne Journal*, having undergone, during the past nine months, a work of restoration and enlargement by the erection of a chancel, has been consecrated by the Bishop of Salisbury. The probable cost of the restoration and addition will be about 700*l.* or 800*l.* The new chancel was erected (under the superintendence of Mr. Slater, the architect of Sherborne Church restoration) by Mr. C. Down, of Sherborne, builder; the plumbing work being executed by Mr. Upsall, of the same place. The chancel is about 25 feet long, by 17 wide, is built of Ham-hill stone, and contains five windows, two in each side, and one at the eastern end, which was erected in memory of the late Major Chadwick, by his family. This window is of coloured glass, supplied by Messrs. Clayton & Bell, of London. It contains three lights. In the centre light is a representation of the crucifixion of our Saviour; and on either side are the 'holy women" and Joseph of Arimathea. The tracery, which is in accordance with the style of architecture, is filled in with evangelistic symbols and the sacred monogram. On the north side of the chancel is a memorial window to the late curate, the Rev. John Sanctuary. This is also of coloured glass, and consists of two lights, representing the apostles St. Peter and St. John. It was placed there by public subscription. The floor is of black and red diamond-shaped tiles, laid diagonally. The roof of the nave (lath and plaster) was scraped, when the framework of an oaken roof was discovered: this has been entirely restored, and is of a waggon-headed form. The old square oaken pews in the nave have been removed, and open, stained-deal seats have been substituted. By the alteration, forty extra seats have been appropriated to the poor. The church will now accommodate about 250 persons. The cost of erecting the chancel (about 300*l*) has been chiefly borne by the Chadwick family, the restoration of the nave being defrayed by the parishioners.

Yeovil.—The restorations at the parish church have been completed. The works have been confined principally to the renovation of the interior. The whole of the internal space from west to east was crowded with heavy galleries, the beams and timbers being let into the stone piers, which were mutilated by their insertion, as were also the attached wall shafts and moulded window jambs. The ground-floor was filled over its entire area with high pews, the principal framing, however, being of good wainscot oak. The timber roofs throughout were plastered and whitewashed internally. All these deformities the architect has had removed. The stonework throughout the church, as far as practicable, has been made good, the moulded bases and other piers restored, a single shaft in an obscure corner retaining its mouldings having been the authority for this part of the work. The mullions and tracery of three side windows, in the south aisle, have been taken out and renewed, and the jamb mouldings made good; also the large window at the east end of the same aisle has been similarly treated. The three side windows just named have been filled with glazing by Messrs. Lavers & Barraud, of London, and in each are arranged various geometrical lines and figures, diapered with foliage and flowers, and enclosing coloured compartments, in which are presented the emblems of the Passion, the sacred monogram, and other devices of symbolical import. The whole of the lights of each window are surrounded with coloured borders and foliage, and surmounted either by a corona or mitre in the alternate compartments. The glass for one other window at the west end of this aisle is still in hand, and will be shortly completed. The eastern window has been executed by the same artists, at a cost of 150*l.* In the five principal lights are depicted five miracles of our Lord, viz., "The blind receive their sight," "The lame walk," "The lepers are cleansed," "The deaf hear," and "The dead are raised up." The tracery in the head of the window is filled with glass displaying foliage. The oaken roofs and timbers of nave and aisles, and chancel, have been oiled, and the bosses and principal moulded ribs and plates have been decorated in gold and vermillion, and powdered with gold stars. The available area of the church, in nave, aisles, transepts, and choir, has been fitted up with open benches, framed with moulded and carved ends of wainscot oak, each exhibiting an appropriate device. Various other restorations have been effected. The north transept is enclosed; but much yet remains to be done to make a complete restoration inside and out. The oak fittings and carvings have been executed by Mr. Geake; the masonry and carpenter's work by Messrs. Harwood & Sons; and the ornamental painting by Mr. Foot, all of this town. The restoration of the Ham-stone work, and the execution of the new reredos, &c., have been carried out by Mr. Joseph Staple, of Stoke-sub-Hamdon, and the entire work throughout, from the designs and under the superintendence of the architect, Mr. R. H. Shout.

METROPOLITAN BOARD OF WORKS.

TENDERS FOR DRAINAGE, &c.

AT a meeting of the Board held on the 24th February, the following tenders were received for sewerage works in the eastern division of the metropolis, viz.—

Munday, at 5 per cent. above prices in schedule.
Walker & Neave, ditto.
Messrs. Wood, ditto.
R. Robinson, 2½ above.
W. Lavers, at the schedule prices.
W. Hill, Whitechapel, 3¾ per cent. under ditto.
E. Cole, 6 per cent. under ditto.
Dethick, 10 per cent. under.
Mr. Dethick's tender was accepted.

For Works in the several Parishes South of the Thames.

Dethick, 5 per cent. above schedule prices.
R. Robinson, 2½ per cent. above.
W. Lavers, 2 per cent. above.
Walker & Neave, 2 per cent. above.
W. Hill, at schedule prices.
E. Cole, 5 per cent. under ditto.

Mr. W. H. Rowe's tender for the Northern Middle Level Sewer (264,533*l.*), submitted with others at the previous meeting, was accepted, his proposed securities being considered satisfactory.

It should be mentioned that at the previous meeting of the Board, a recommendation to increase the salary of the superintending architect from 800*l.* to 1,000*l.* was negatived. Further, a report was received from the Building Act and General Purposes Committee, on a letter from Mr. William Henry Smith, submitting, for certain reasons stated therein, that Mr. Reeves, Police Surveyor, does not fulfil the description of a "competent surveyor," as defined by the 33rd clause of the Metropolitan Building Act, and that the Board has done wrong in certifying that he is entitled to receive fees under the provisions of that Act for the supervision of dangerous structures.

The committee had replied to Mr. Smith that the Commissioners of Police, and not the Board of Works, were responsible for the selection, and that they did not agree in his interpretation of the term "competent surveyor."

Mr. Smith had replied as follows:—

4, Devonshire-place, Brighton, December 8, 1859.

Sir,—Your letter, dated December 1st, has been forwarded to me here. Having neither the "Act" nor any adventitious aid, I answer it at a disadvantage.

Considering the great and irresponsible power with which the surveyor is invested by the Metropolitan Building Act, 1855, I regret to find the Metropolitan Board of Works willing to construe "competent" to mean only "reasonably skilful."

The competency of a surveyor is, ordinarily, matter of opinion, the opinion of one man not being binding upon another. Judging from his works at Westminster, I may entertain the erroneous opinion that Sir Charles Barry is not a "competent" surveyor. If he does his work to his satisfaction, a commissioner of police may consider Z 202 of the force a "reasonably skilful" surveyor.

The Metropolitan Buildings Act, 1855, has provided a standard by which the surveyors employed in carrying out its provisions may be measured. The survey (I quote from memory) is to be made by the district surveyor, or some competent surveyor.

The district surveyor must be a competent surveyor: the surveyor who may act in his stead must be a competent surveyor. We turn then to the Act, and find it considers those only competent who have received a certificate of competency from certain constituted authorities. I cannot conceive anything more clear.

I have addressed myself to this one point only, that I might not unnecessarily occupy the attention of the committee; but there are those who dispute the actual as well as the legal competency of Mr. Reeves, and the numerous nameless staff who discharge his duties for him.

I decline to combat; but you must not therefore conclude that I concur in your definition or limitation of the duties of the Metropolitan Board of Works in this matter.

I presume I shall be informed of the decision of the Board, that I may, if I deem it expedient, bring the subject under the notice of other parties.

WILLIAM HENRY SMITH."

The committee reported that this reply had in no way altered their opinion.

COTTAGE IMPROVEMENT.

YOU state Miss Martineau builds a cottage in Westmoreland for 60*l.*, the particulars of which I had already read of; but you will see that no details are given by that lady of any real weight to either landlord or builder.

I have not seen the Cottage Improvement Society's plans, alluded to in your last number; but what rent does a proprietor obtain for two cottages erected at the cost of 160*l.*? I erected two cottages (a pair) on my estate, with two living-rooms, three bedrooms, larder, and porch. The patent fire-range made by a firm in Newark. Fireplace in one bedroom upstairs (for woman in confinement or persons in illness); spouting carried to a soft-water tank under kitchen, with small pump. Built of my own stone, mabbled, slated, and white foreign wood; privy, ash-pit, and two pig-sties,—price 260*l.* Now the labourers about here (Yorkshire) obtain 15s. a week, and I only ask 4*l.* per annum for these cottages—8*l.* on 250*l.*—and yet they grumble at the rent, and think a hovel at 20s. for six months to be preferred.

My tenant-farmers came to me and complained of the want of labour, and proposed erecting cottages through the Lands Improvement Company. To this I acceded. Now the lowest-priced three-bedroomed cottage we can erect is 125*l.* (the tenant-farmer doing all the leading). The per centage of 6¾ per cent. charged by the Company for twenty-five years makes the rent of each cottage about 8*l.* 10s. per annum (independent of leading bricks and lime four miles). I, as landlord, do not obtain a sixpence, and my tenant pays between 8*l.* and 9*l.* for a cottage for his labourer. Too high a rent, in my opinion, remembering the wear and tear of twenty-five years. I consider the subject requires ventilation, which I trust it may have in your columns. Either cottages must be built cheaper or labourers at 15s. a week give higher rents than they feel inclined to do now.

A LANDLORD.

SIR,—In your last week's number you quote from *Once a Week* some particulars, by Miss Martineau, of cottage building in Westmoreland; you give the sizes of the rooms, viz. "13 feet by 10 feet," and "12 feet by 10 feet 6 inches," "and two bedrooms above;" you then express a regret "that Miss Martineau should lend countenance to the construction of cottages with only *two* bedrooms," and recommend the plan issued by the Cottage Improvement Society, "the cottages with three bedrooms."

Every one will agree with you "that the male and female children should be separated," and that "cottages for families with only two bedrooms lead to an incredible amount of vice."

If you refer to the Cottage Improvement Society's plan, you will see that the living room is 11 feet 4 inches by 9 feet 4 inches, and the kitchen 11 feet 4 inches by 9 feet 4 inches also; there is one bedroom over the living-room, and two made over the kitchen, one of which is 9 feet 4 inches by 5 feet 5 inches, and the other 6 feet 10 inches by 5 feet 9 inches, which must be admitted to be scarcely worthy of being called bedrooms, one having less than 300 cubic feet, and the other about 350 cubic feet.

Now, by dividing the smaller bedroom in Miss Martineau's plan, viz., the one 12 feet by 10 feet 6 inches, you can make two bedrooms larger than the Society's plan gives,—one would be 10 feet 6 inches by 6 feet, and the other 8 feet by 5 feet 10 inches,—each about one-third larger than the Society's plan.

My attention was called to this from having seen the Society's plan partially carried out about three miles from this place, by the Rev. Shelton Suckling, rector of Shipmeadow, Suffolk, who purchased some wretched hovels in his parish for the purpose of pulling them down and erecting cottages fit for human beings. I happened to pass these a few weeks since, just before their completion, and saw the rev. gentleman. I asked him some questions respecting the Society's plan, as one of my employers (who has built several cottages with three bedrooms) proposes building from the Society's plan. I asked Mr. Suckling if he did not find the two bedrooms over the kitchen very small? He replied that he had not divided that part into two, as he found they would be small and useless if divided; he also said, that if he built any more, he thought of carrying the walls about 1½ foot to 2 feet higher, and making rooms in the roof, which I suppose would add 20*l.* or 30*l.* to the Society's estimate of 168*l.* I thought this increased height of the walls would spoil the proportions of the Society's plan, and the rooms in the roof would be so hot in summer and cold in winter as to be of little service.

There is one other objection, I think, to the Society's plan; the pantry is only a very small closet under the stairs, with no chance of admitting external air,—not a very good arrangement for keeping the food, &c., of the family.

I think the Society scarcely give what their plan states: "A pair of inexpensive cottages, with three bedrooms each; cost, 168*l.*"

JOHN D. BOTWRIGHT, Builder.

HOLLOW WALLS.

SIR,—I take the liberty of forwarding to you my experience with regard to hollow walls. Several years since I introduced in the erection of a small detached house a 12-inch hollow wall, constructed with a 4½-inch brick wall inside and outside, leaving a space of 3 inches between, and tied together with 12-inch headings at convenient distances, to make the work secure. Small air-grates were inserted at the bottom and top of the wall, to give a current of air through the walls. I found it answer very well, and since then a number of houses have been built in the same manner: one especically I may name, that has been rebuilt by the side of a brook, in a very damp situation,—so damp that it was impossible to keep paper upon the walls of the house previously standing upon the same spot. I have taken the trouble to inquire at this and several houses if they find any damp at any time in any particular place, and the answer is in the negative. I therefore infer that the above experiment is successful, and that the damp does not find its way through the headers, neither does the admission of a current of air cause the inner portion of the wall to become damp; but, on the contrary, I think the admission of air would keep it dry; care, however, should be taken that a course of headers is not put under the windowsills, or the damp will find its way through them, especially if the sills are not properly throated. If I am in error I should be very glad to be set right.

WM. PEACHEY.

SOCIAL BRIDGES: THE SEWING-MACHINE.

EVERYONE remembers the immortal "Song of the Shirt" of poor Tom Hood, and the fearful revelations respecting the condition of the needlewomen in general. It seemed as if labour had been ground down to its lowest point, and that no prospects of relief were possible. The facility with which females could take to needlework always caused the labour-market to be overfull, and the rate of wages to be maintained at the very minimum, thus causing an occupation which might have afforded a chance of profitable employment to many to become one of the most precarious means of existence possible. This arose partly from a fact which is now occasioning one of the most remarkable controversies of the day, namely, as to the means of employment for females in general. How far the invention of the sewing-machine will affect the question it is impossible to tell at present, but its use has caused many of the former ill-paid needleworkers to receive good wages as machinists, while the greater number, if not all, of those who were temporarily deprived of work by its introduction have since found full occupation in the various finishing departments, because the increased facility of production has occasioned a large and steadily increasing demand. The strikes at Northampton, Stafford, and elsewhere, having ceased, and the above facts having become apparent, have occasioned the machines to come into general use, and led to many new and valuable improvements in their construction; so that, after being beaten for awhile, the English-made machines stand confessedly superior to all their foreign rivals.

House-decorators, upholsterers, and others are availing themselves very largely of the sewing-machine in the getting up of tapestry fittings, curtains, hangings, &c.; and the value of the machine to them has been largely increased by the invention of a binding guide to fit on the machine for the purpose of binding the edges of the materials. The beautiful regularity of the machine-made stitches occasioned the less finished appearance of the hand-binding to spoil the harmony of the whole. Hence the value of the new invention. The best binding-guide seems to be that made by the Messrs. Bradbury & Co., of the Rhodes Bank Foundry, Oldham. It has come into extensive use, and is a beautifully simple contrivance, of a highly valuable nature to those who are in the habit of manufacturing textile decorations for mansions and large private or public buildings.

J. P.

WANTED, AN ASSISTANT!

SIR,—A relation of my experience in regard to answering advertisements may, perhaps, prove useful to others.

A few weeks since I replied to an advertisement in your paper for an architectural assistant, with a salary of 70*l.* per annum, which, in the folly of my ambition, though young in the profession, I imagined myself to be fully worth; especially when flattered by the firm that I should suit them. Judge, then, of my surprise, when admitted to an interview, at a country town not 100 miles from London, to find the firm are auctioneers, and therefore not requiring a junior assistant, as I admitted myself to be, but a gentleman competent to carry out all the various branches of a good professional practice, which they hoped to form out of his services; particularly mentioning designing, competition and other drawings, preparing working and detail drawings and specifications, and superintending the works in progress; for which duties the magnificent salary of 70*l.* per annum is all the poor fellow might expect.

AN ARCHITECTURAL ASSISTANT.

THE MAGNESIAN LIME-STONE FROM MANSFIELD WOODHOUSE.

SIR,—Observing a letter in your last number on this subject, I think it but right, though that letter appears in the form of an advertisement, to send you a line confirmatory of the statements which it contains, so far at least, as my own observation extends.

I believe (though that is a matter of opinion only) that the Mansfield Woodhouse stone may be considered to be, virtually though not nominally, that recommended by the Geological Commission. The parts of the Houses of Parliament in which it was made use of have been recently pointed out to me by a perfectly disinterested party, who was at the time engaged on that work, and these parts were certainly in a high state of preservation, so that one would suppose that, had the same stone been used throughout, the evils since complained of, would have been avoided. The structure of the stone, when examined with a magnifying glass, appears much more perfectly crystalline than some other stone, which seems to suggest a *primâ facie* probability of its being more durable. As to colour and texture, it is about the most beautiful stone that I know of; indeed, I know no material preferable to it for work of a superior character, where beauty, compactness, and durability, are the chief desiderata.

GEO. GILBERT SCOTT.

WORKMEN'S INSTITUTE AND BENEFIT CLUB, 34, YORK-ROAD, LAMBETH.

A LECTURE was delivered by Mr. J. Tidd Pratt, registrar of Friendly Societies, to a large body of workmen and others, assembled in the reading-room of this institute, on Friday evening, the 24th. The meeting was presided over by Jervoise Smith, Esq., and the following gentlemen were also present, viz.:—Messrs. Charles Lucas, St. Leger Glynn, G. J. Bowyer, J. S. Gilliatt, A. West, F. D. Mocatta, C. W. Grenfell, W. B. Ranken, and W. A. Wilkinson.

In the course of the comprehensive lecture which Mr. Pratt gave "On the Constitution of Friendly Societies," he said there were six objects essential to their success to be provided for, viz.:—Relief in sickness, to the age of sixty or sixty-five; a superannuation allowance after that age; medical attendance and medicine; endowments for children; a sum of money at death; and deferred annuities to members from the age of sixty-five. He said that sixty or sixty-five should be the limit to granting relief in sickness, because after that age came infirmity and old age,

which should be met by insuring for superannuation; pointed out the advantage of members paying according to their age, and the importance of the rules and tables being duly certified; and added that, as the workmen's benefit club, the rules and tables of which he himself and an actuary had certified, included these several features, he considered it to be the best society in the kingdom. At the conclusion of his lecture Mr. Pratt was addressed by some of the workmen present, to whom he gave explanations; and a vote of thanks to him was passed.

STAINED GLASS.

Ardearne Church.—Lord Lorton is about to place in the church of Ardearne (now rebuilding) a memorial window, to the memory of the late Viscount and Viscountess Lorton, at a cost of about 300*l.*

Gloucester Cathedral.—Messrs. Clayton & Bell, Mr. Wailes (of Newcastle), and Mr. Hardman (of Birmingham), have furnished the Dean and Chapter with designs for the restoration of the east window of this cathedral. The window is 84 feet in height. Mr. Warrington has also sent a specimen of imitation ancient stained glass, with which he suggests the window should be filled.

St. Thomas's, Newport (Isle of Wight).—Two sections forming part of the great window proposed to be placed in St. Thomas's Church, says the *Dorset Chronicle*, have been forwarded to the churchwardens for inspection, and have been placed in one of the chambers of the Town-hall. They consist of two designs, completed in stained glass, from the original plans of the artist, Mr. Holland, of Warwick. The first one, having an arched top, represents the angel appearing to the Virgin Mary, with the Holy Ghost descending on her in the shape of a dove. The other section is a square one. The subject is "Christ's entry into Jerusalem on an ass."

Books Received.

Memorials of Workers: the Past to encourage the Present. A Lecture. By GEORGE GODWIN. Robert Hardwicke, 192, Piccadilly; and at the Office of the *Builder*. 1860. Price 6d.

WE content ourselves, for obvious reasons, with announcing the publication of this lecture, and giving a few extracts from it. The writer says as to his

Motive.—"It happens that I am occasionally called on to correspond with men of the humbler classes who are struggling onward,—men who desire to cultivate the powers with which they are endowed, who have aspirations beyond their position, and, in many cases, courage and energy to carry them out if they could assure themselves that success was probable. The fear, however, with which they are possessed that, work as they may, there is no chance of advancing, relaxes their endeavours and keeps them down. They are more ready to say with Johnson,—

> 'Rarely they rise by virtue's aid who lie
> Plunged in the depths of helpless poverty,'

than with Milton, who teaches that,—

> 'The mind in its own place and in itself
> Can make a heaven of hell, a hell of heaven.'

'What can I do?' writes one, 'I have neither money nor friends. Strive as I may I shall never make myself felt: speak as I may the world will not listen.' The obvious answer to this is,—recollect what others have done who were as ill-placed as yourself, and who laboured under equal if not greater difficulties:—that their number is not small; that they may be pointed to in every pursuit and every branch of human knowledge;—and it occurred to me some time ago, that it might not be useless on a fitting occasion, to describe some few careers which afford encouragement, and might incite to worthy efforts. . .

When the heart of the striver sinks; when the world looks like a desert, and no pathway is visible; when energy has evaporated, and effort seems useless; then the recollection of what others have done, what difficulties they overcame, how bright a future they forged out of a gloomy present,—how beautiful a tissue they wove out of a tangled yarn,—has a value that can scarcely be estimated,—calls back the fleeting powers, braces the mind, and encourages to fresh exertions."

Value of Perseverance.—"Is there a man reading these lines, who, recalling the cow-boy, the picker at the colliery, or the mender of clocks, uneducated and unfriended, will venture to say that his own opportunities and chances of progress are not as great as those of stout-hearted George Stephenson? 'Do as I have done,' he often said to those who complained to him of want of success,—'*persevere*.' Every step he made was conquered by patient labour and devotion to the work in hand, whatever that might be. Take a lesson from him:—

> 'Art thou poor? Does Fame pass by thee?
> To thy work with vigour hie thee;
> Persevere: 'tis but to try thee.'"

Art and Manufacture.—"Flaxman was always proud of his early works in connection with Wedgwood. He felt that, in wedding art to manufacture, in producing, for example, his beautiful chessmen, or his exquisitely formed cups, he was aiding in disseminating a taste for art and a love of the beautiful. It is to be hoped the time will soon come, when every article of domestic use may be obtained of tasteful design: none the dearer because elegant, appropriate, and harmonious. To bring this about, we want, not merely educated art-workmen, but an art-educated public. If people will not buy vessels of beautiful form, or carpets of harmonious tints and sensible truthful patterns, we may be sure that manufacturers will cease to produce such, and will content themselves with those works of questionable taste which command more favour."

Money Value of Art.—"The prices paid for specimens of pottery and porcelain afford striking instances of the power of art and opinion to confer value on mean materials. At Mr. Bernal's sale, one of Palissy's small dishes, 12 inches diameter, with a lizard in the centre, was sold for 162*l.* In the Ceramic Court of the Crystal Palace, a most interesting and important collection, there is a Sèvres plate for which 800*l.*, and a dish for which 1,000*l.*, have been offered. At one of the Government exhibitions at Gore House, two or three years ago, there were two small Sèvres vases for which a dealer told me he would give 3,000*l.*

Soane and his Museum.—"Soane, the architect, born 1753, was the son of a bricklayer, at Reading. Poor and neglected, he came to London; one of—

> "The brave spirits who go up to woo
> That terrible city only whose neglect is death,
> Whose smile is fame."

He went into Dance's office as an errand-boy, but he worked his way;—built the Bank of England;—many structures for the government which Time's erasing fingers, helped by Sir John Soane, have sponged out;—became Sir John Soane; and, when he died in 1837, he left behind him, to say nothing of a fine fortune, a remarkable collection of books, prints, pictures, and antiquities for the benefit of the public. Whether this collection, boxed up in the house in Lincoln's-inn-fields, and approachable by tickets during a small part of the year, is made as available as it should be may be a question with some. It is certainly, however, no question with me: and I trust a long time will not elapse before a complete change in the management be made. It has, at present, all the stillness and repose of private property, and from year's end to year's end the books and folios remain closed."

The Scott Monument, Edinburgh.—"The ranks of the working masons would supply us with many examples of self-teaching and self-raising. George Mickle Kemp, who designed the Scott Monument in Edinburgh, was brought up an obscure carpenter, and impelled by his love for Gothic architecture became a working mason, getting employment, when he could, near an old building, so that he might measure and draw it. He worked his way all over Scotland and England, and in some foreign countries; would walk a whole night to get a detail for his sketch-book, and this without a cheering voice, for no one knew of his doings. When the Scott competition was advertised, he set himself to apply the knowledge he had acquired, and entered the lists without a friend. The design was submitted under the signature "John Murdo;" but, with a thoughtlessness that characterized him, he omitted to enclose his right name and address, so that for some time he remained ignorant of its selection, and the committee of him. Great was the surprise that followed when the author of the design was found to be a rough, self-taught man. Much controversy ensued; great anxiety for poor Kemp; then a triumph, and soon after an untimely death, which, but for a too common, but none the less fearful failing, had probably not occurred."

The lecture is published in a cheap form for distribution by such as may chance to think it likely to be useful.

Journal of the Bath and West of England Society for the Encouragement of Agriculture, Arts, Manufactures, and Commerce. Vol. viii. Part I. London: Ridgway, Piccadilly. 1860.

AMONGST the articles in this well get up Journal are reports on the exhibitions of arts, and of implements, live stock, &c., held at Barnstaple in June last. The Arts Exhibition appears to have been varied in detail, and attractive as a whole. In the fine arts department, which, together with a selection from the Brompton Museum, occupied the middle part of the building, were some drawings by Turner, "some of whose relations were living in Barnstaple as artisans, and came to look and wonder." The Arts Exhibition building was simply a wooden one, 100 feet long by 40 feet wide. The cost of the skeleton building, roof, and glass (the permanent property of the Society) was 250*l.*; and the hire of wooden flooring, sides, &c. cost 100*l.* There was also a canvas shed, 75 feet by 40 feet, hired for some 26*l.* to 30*l.*, and other accommodations. The exhibition as a whole yielded a sum exceeding by more than 1,500*l.* any amount received at former meetings in the West of England.

The Journal under notice is in future to be issued in two semi-annual parts, instead of in one larger volume as heretofore.

Miscellanea.

A FREE LIBRARY FOR BIRMINGHAM.—It has been resolved by a large majority of a meeting of burgesses of the borough, called by the mayor, and held in the Townhall, to adopt the Free Libraries and Museums Act. There must have been about 1,500 persons present.

THE PROPOSED EXHIBITION OF 1862.—The council of the Society of Arts have begun to move in this matter. The guarantee deed for raising a sum of not less than 250,000*l.* on behalf of the Exhibition has been approved, and Earl Granville, the lord president of the council; the Marquis of Chandos; Mr. Thomas Baring, M.P.; Mr. C. Wentworth Dilke, and Mr. Thomas Fairbairn are made trustees of the fund. As soon as the required amount is guaranteed, the intention and scope of the Exhibition must be made widely known, so that those who propose to take part in it may get to work. There is no time to lose.

BISHOP AUCKLAND TOWN-HALL COMPETITION.—We are informed that the first premium has been awarded to Mr. J. P. Jones. The design is Gothic in style.

THE IRONMONGERS' ASSOCIATION.—At a meeting, on the 24th February, a lecture was given by Mr. W. B. Tegetmeier, "On Lamps, their Chemistry and Construction," at 270, High Holborn.

SOCIETY FOR THE ENCOURAGEMENT OF THE FINE ARTS.—The first conversazione of the season was held on Wednesday, February 29th, at the Gallery of the Architectural Photographic Association, Conduit-street, when Mr. G. Montague Davis, B.A., read a paper "On the Fine Arts, their Rise, Decline, and Present Aspect." And this was followed by a performance of vocal and instrumental music.

INSTITUTION OF NAVAL ARCHITECTS.—Meetings of this society are now being held in the Hall of the Society of Arts, Adelphi, Strand. On this Friday, March 2, there will be read at the evening meeting, papers "On an Improvement in the Form of Ships," by Mr. Joseph Maudslay; "On a Method of Constructing Diagonal-Built Ships," by Mr. J. White; and "On Certain Improvements in Marine Engines," by Mr. Robert Murray: and on Saturday morning, "On Mechanical Invention in Relation to Improvements in Naval Architecture," by Mr. N. Barnaby; and "On the Wave Line Theory, Part II.," by Mr. J. Scott Russell.

A WARNING.—A foreigner, who gives the name of John Bower, or Bauer, has for the last three years been living upon architects, by travelling from town to town and soliciting alms from them, upon the plea that he was formerly occupied in the drawing-office of the French sappers and miners, whence he deserted many years ago, and he has occasionally been employed in the offices of English architects; with the usual sequel that he has lately lost his wife, and been obliged to sell his instruments. On the 29th of February he was at Cambridge, on his way to London.—A. B.

THE SHEFFIELD TRADES' UNION.—The "Association of Organized Trades of Sheffield and the Neighbourhood" have held their first public dinner at the Music-hall, Sheffield, under the presidency of the mayor; Mr. C. Bagshaw, the president of the Association, occupying the vice-chair. Upwards of 400 persons partook of the repast. The after proceedings, which were protracted to a late hour, were enlivened by glees and songs. Much good sense (with an intermixture of less judicious material, however,) was displayed in the speeches delivered in course of the evening. One speaker, the Rev. B. Herford, after referring to the vast power of the organization, and what it ought to do towards the promotion of education, the abolition of drunkenness, the payment of wages on Fridays, &c., went on to speak thus of the villanous doings which, as the mayor said, had made Sheffield an abhorrence and a disgrace to the nation. "As a friend and an outsider [we quote from the local *Independent*], he felt bound to tell them that the impression on numbers who would fain take their part—upon some who did take their part in spite of it,—was, that they did not always fight fair in Sheffield. There was sometimes kicking; and though they might each lay his hand upon his heart and say, 'I don't know who did it,' yet somebody did it; and it was done for the sake of the union. Those rattenings—that taking away—he would not call it stealing—of wheel-bands, was a silly trick. Then again, as they knew, there were worse things. He had been in Sheffield four years [the *system* was rampant at least fourteen years ago], and during that time those worse things had occurred, not only once, twice, thrice, nor simply half a dozen times. Those explosions, those assassinations—he did not speak of them as outrages; they were mean, dirty, un-English tricks, whoever they were done by. He did not say that unions, or union secretaries, could be held responsible for them, but he did say that unions could help them if they tried. If all the working men present at this meeting were to go away with the resolve to wipe this stain from their class; resolve that if they could catch a man who had done such a thing they would turn him out of their order altogether, would send him to Coventry, and have nothing to do with him; if they would look upon the thing in that way, these outrages would in a mysterious way cease. He wished to God it was so. Such proceedings cut away the ground from them (the middle-class men), who tried to defend unions: they made defence difficult because they were brought forward as the practices of unions. It was well enough known from what these arose, though it might not be known who did them."

THE STATUE OF RICHARD CŒUR DE LION.—Mr. Hankey asked the First Commissioner of Works in the House of Commons when the statue of Richard Cœur de Lion, by Baron Marochetti, for the erection of which a vote of 1,650*l.* was granted last year, would be put up on the intended site. Mr. Cowper said that the delay had arisen in consequence of the difficulty of getting the granite pedestal out of the quarry. The statue was all ready except the pedestal, which would be ready within two months.

MONUMENTAL.—The committee of the Chester Memorial to Matthew Henry have completed arrangements for the erection of a polished granite obelisk. Mr. James Harrison, architect, has made the design, and will assist the committee in its erection. The obelisk will be 15 feet high, on a pedestal of the same, 2 feet 8 inches, and plinth 1 foot 6 inches, on a basement of steps 5 feet high, of Halkin limestone. The whole elevation will be 24 feet 2 inches; and, when completed, it will cost about 200*l.* The obelisk will be executed by Mr. A. McDonald, of Aberdeen.——The committee appointed, at Glasgow, for erecting a memorial window, to the late Professor Nichol, the astronomer, in the crypt of the cathedral, are sending proposals for estimates, it is said, to some of the most eminent designers in this country and abroad. The subscriptions have been limited to 1*l.* each. The treasurer to the fund is Mr. John Kerr, 14, Moore-place, Glasgow.

BOROUGH SURVEYORSHIPS.—The surveyor to the Worthing Local Board of Health (Mr. S. J. Smith), is said to have resigned his office.—We have received a suggestion, says the *Stockport Advertiser*, whether, on the appointment of a successor to the late Mr. Samuel Hunt, as borough surveyor, it would not be wise if the Town Council would select one for the whole borough, who could devote all his services to the office, and by which means a great deal of "petty jobbing" might be prevented, and money saved in the five townships, where there are as many district surveyers.

GAS.—The Liverpool Gas Company have just declared their usual maximum dividend of 10 per cent. per annum, for the half-year last past, free of income-tax. The continued increase of demand for gas has been met by an issue of 500 shares of 25*l.* for outlay.——The forty-sixth half-yearly meeting of the Cardiff Gas-Light and Coke Company has just been held, and a dividend at the rate of 10 per cent. on the old shares, and 8 per cent. on the new shares, declared.——From the "Report" of Dr. Letheby, the medical officer of health for the City of London, "On the Great Central Gas," it appears that this company's gas is 29 per cent. above the requirements of their Act of Parliament as respects average illuminating power; and that the chemical quality of the gas has been equally satisfactory as regards the absence of ammonia, sulphuretted hydrogen, and fœtid tar water. During the last eight years, the report states, that illuminating power has been 25 per cent. above the standard, with an advantage of 11 per cent. in favour of the argand burner. The average chemical results are said to have been also favourable.

SHORE TO SHORE TUNNEL, SCARBOROUGH.—A scheme has been projected by Mr. Josiah Forster Fairbank, of Scarborough, civil engineer, for making a tunnel under the town, from the South Sands to the North Shore, and the scheme, with plans and sections, has been sanctioned by the local council. Mr. Fairbank stated to the council that he had entered into an arrangement with each of the owners of property under whose land the proposed tunnel is to be made. The engineering difficulties are not thought to be great, the nature of the strata being favourable for such an operation; and very little water is expected to be met with. The tunnel will be arched and lined with bricks from one end to the other. The length of the tunnel is 540 yards, while the distance over the hill to each end is 2,600 yards. It is not contemplated making a tunnel for horses and carriages, but only for foot passengers. The tunnel will be brilliantly lighted, and will be open all day, and about half-way there will be a daylight shaft, for ventilation, under which it is proposed to construct a stalactite cave, with rockery, and alpine plants. The probable cost of the undertaking will depend upon the size of the tunnel, but the engineer estimates it at from 6,000*l.* to 10,000*l.*, according to size, which sum includes every expense. A company is to be formed under the Joint Stock Act, with limited liability, and it is thought probable that the work will be in progress during the coming summer season.

THE SERPENTINE IN HYDE PARK.—In the Commons Mr. Cowper has procured the appointment of a committee to consider the means of effectually cleansing the Serpentine.

SCULPTURES of ELEUSIS.—The model of the newly-discovered sculptures of Eleusis, which have been placed in the Beaux Arts, is attracting crowds to view them. These sculptures were brought to light about a year ago, in digging the foundation of a school-house at Eleusis, and are thought to be the remains of the temple of Triptolemus, often mentioned by ancient writers as containing genuine specimens of classical sculpture.

THE STRAND-BUILDINGS COMPANY.—The committee of this company (for the erection of improved dwellings in Eagle-court, Strand) has just published their second report. The rents for the first half-year, ending at Christmas, 1858, amounted to 168*l.* 5s. 6d.; and they were during the past year, for the first half, 201*l.* 13s. 4d.; and for the last half, 225*l.* 18s. 9d. During last December all the sets of rooms were occupied, and the rental rose to 9*l.* 6s. a week. The efforts made to establish a laundry, washhouse, and baths had failed. The balance of income over the expenditure of the year, including arrears, amounted to 237*l.* 17s. 2d., of which 112*l.* 10s. had been distributed as dividend, at 4½ per cent. per annum to Midsummer, leaving 125*l.* 7s. 2d. for further dividend, at the same rate of interest.

PURIFICATION OF THE THAMES AND THE SERPENTINE.—Mr. C. M. Kottula, of Ely-place, Holborn, has patented (but offers without stipulation of fee or reward for purifying the Thames) the use of salt with which to increase the specific gravity of the fresh water in tidal rivers near towns in which the sewage is emptied into the river, the purpose being to cause the contaminated water to sink, and so pass off seaward, while it is replaced by clear sea-water. Whether Mr. Kottula has ever calculated how much salt it would require to salt the Thames we do not know, but we should fear it would be about as difficult to do so effectually to the end in view as to "set fire to the Thames." Still, even that is not an impossibility, if the old alchymist, Van Helmont, is to be believed; for he says that when Thames water is used on board of ships, it stinks in the tropics, and may then be set fire to, after which it becomes quite sweet and drinkable again! For the purification of the Serpentine Mr. Kottula proposes eighty tons of alum, which he says will sink a green matter to the bottom, and so freshen the water for many years.

KETTERING CHURCH AGAIN STRUCK BY LIGHTNING: STILL NO LIGHTNING CONDUCTOR.—On Sunday afternoon before last, as the congregation assembled at Kettering Church were engaged in Divine worship, the edifice was struck by lightning, and a scene ensued which will not be soon forgotten by those present. As they were on their knees repeating the General Thanksgiving, a mass of electric fire was seen to rush up the nave from below the western gallery, and a tremendous explosion was heard, resembling the report of artillery. Most of the people rushed simultaneously from their pews in frantic terror; some, who were too much excited to open the pew doors, climbing over the tops, and others, upsetting the forms with the school children, caused a general panic also among them. The confusion that ensued cannot be described. As the panic was at its height, a second flash, intensely vivid, followed instantly by loud and crackling thunder, added to the alarm. There was a great rush to the doors, and a frightful crush, and when egress was obtained, many fled through the storm, leaving their hats, cloaks, and other garments, behind. Most fortunately no one was seriously hurt. It was found that the spire had been struck near the second window on the west front, the mullion of which was driven in, and one of the pinnacles knocked off, as well as some other damage sustained. The chime wires were melted. Some of the stones forced from the spire fell into the bell chamber, and others outside the tower. It appears that the lightning ran down the stove piping near the western entrance into the church, the flue probably acting as a conductor, for want of a better one. Marks of its agency may be seen on the flue. This is the second time this spire has been struck by lightning within the past seven months. The Northampton *Herald* says it is now intended to provide an electric conductor; and full time too: had any lives been lost on this occasion, the churchwardens or other authorities of the church would have deserved trial and sentence for culpable homicide, in neglecting such a warning as the lightning stroke of last year: the want of a conductor still, betrays either gross carelessness or gross ignorance.

NEW WESTMINSTER BRIDGE: HEINKE'S DIVING APPARATUS.—Now that the new bridge is about to become partially available to the public, it is due to the ingenious apparatus of Mr. Heinke, of Portland-street, Portland-place, to state that all along it has been in successful use in doing the whole of the under-water work. This same apparatus has been used in the demolition of Rochester-bridge, and Mr. Heinke was engaged by the Government to teach its use to the royal engineers for that and other purposes. One singular advantage of this apparatus appears to be that the life of the diver is not necessarily sacrificed by accidents to the apparatus, and the dress is used as an airholder, by means of which he can either ascend or descend at will, as, in fact, the fishes do by means of what is sometimes called "the swim."

TENDERS

For the erection of an additional wing and other works to the Tavistock Hotel, Covent-garden, for Messrs. Harrison & Co. Mr. Wm. Munt, architect. Quantities supplied by Mr. R. L. Curtis:—

Nixon	£11,977 0 0
Browne & Robinson	11,924 0 0
Lawrence & Sons	11,894 0 0
Stoner	11,800 0 0
Hayward	11,492 0 0
Aldin	10,600 0 0
Evans, Brothers	10,082 0 0

For new stables, &c., Over Llowey, near Bridgewater. Mr. H. Clutton, New Burlington-street, architect:—

Mansfield, London	£6,150 0 0
I'Anson, ditto	6,100 0 0
Myers, ditto	5,850 0 0
Pollard, Taunton	4,950 0 0
Pritchard, London	4,566 0 0

For Presbytery attached to St. Mary's Catholic Church, Leith, for the Rev. J. Noble. Mr. E. Welby Pugin, architect. Quantities supplied by Mr. Marples:—

Wells	£2,600 0 0
Kinghorn	2,437 0 0
Wilkie	2,370 0 0

For finishing three houses, Nos. 5, 6, and 7, Argyll-road, Kensington, for J. P. Shaw, esq. Mr. E. W. Crocker, architect:—

Macey	£1,129 0 0
Pritchard	1,080 0 0
Little	769 0 0

For the Abel Smith Memorial Schools, Hertford. Mr. John M. Hooker, architect:—

Coker, Ware	£1,665 0 0
Higgs & Barker, Dunstable	1,648 10 0
Rayment, Hertford	1,498 0 0
Collins, ditto	1,464 12 0
Ekins & Sons, ditto	1,445 0 0
Andrews, ditto	1,440 0 0
Kirkby, Henlow	1,358 0 0
Brown, Ware-road	1,244 10 0
Pooley, Peterborough	1,240 0 0

Morton Bagot Rectory.

Hardwick & Son	£986 0 0
G. Street	965 0 0
Clark & Son	938 0 0
Wm. Grove	895 0 0
Thomas & Roberts	895 0 0
Wm. George	874 0 0
Messrs. Callaway	867 2 11
Hallan & Co.	850 0 0

SIR,—We have received a letter from the architect explaining that our tender was not accepted because the rector was personally acquainted with Messrs. Callaway, builders, of his locality; but that otherwise our "tender would readily have been accepted." Why did the rector advertise in a widely-circulated London paper for tenders? Why did he not limit his application to builders with whom he was personally acquainted, and so have saved the time and expenses of other competitors?

HALLAN & CO.

For a dwelling-house at Newark for Mr. H. Hall. Mr. Alfred Allen, architect. Quantities supplied:—

Lane	£883 19 0
Mackenzie	834 10 0
Cooper	789 0 0
Henderson (accepted)	785 0 0

For building a storehouse and superintendent's rooms in Hyde-park for the Royal Humane Society:—

Lavers	£375 0 0
Naish	359 0 0
Tracey	330 0 0
Caswell	285 0 0

For re-erection of Star and Garter Tavern, Kensington-road, for Mr. John Compton. Mr. W. H. Heath, architect. Quantities supplied:—

	Caen Stone.	Portland Stone. Extra for front.	Marble. Extra for front.
	£ s. d.	£ s. d.	£ s. d.
Langridge	2,755 10 0	14 8 6	175 18 0
Lawrence	2,650 0 0	25 0 0	60 0 0
Pritchard & Sons	2,566 0 0	16 0 0	95 0 0
Axford & Co.	2,454 0 0	16 0 0	87 0 0
Heath	2,312 0 0	25 0 0	110 0 0
T. Harvey, Hammersmith (accepted)	2,250 0 0	20 0 0	105 0 0